Computer Chronicles Revisited

Volume 2 (1984 - 1985)

S.M. Oliva

Computer Chronicles Revisited, Volume 2

1984 - 1985

S.M. Oliva, LLC

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Introduction

This ebook reprints a series of posts from my blog *Computer Chronicles Revisited*, which I launched in May 2021. Each chapter covers a single episode of the PBS series *Computer Chronicles* that aired during that show's second season (1984-1985). There is an extended recap of each episode followed by analysis of what became of the people and products featured on the program. Each chapter then concludes with a miscellany section called "Notes from the Random Access File," an homage to the news segment that followed most *Computer Chronicles* broadcasts.

As of this writing in June 2022, I have covered the first two seasons of *Computer Chronicles* and am completing work on the third season. If you are interested in supporting my work, please consider joining my Patreon or visiting my Support page.

Chapter 1: The Sony CD-ROM, Pioneer PX-7, and Halcyon

This episode of *Computer Chronicles* shows some of the minor tweaking to the show's format between the first and second seasons. The first is the addition of Wendy Woods as a correspondent. Woods took over narrating the customary B-roll feature following the introduction and also conducted remote interviews with guests related to the topic of the episode.

The second change was that Stewart Cheifet now delivers a brief "cold open" before each episode introducing the topic. This was often done as a remote shot. The third and final change was that the main portion of the show now ended with a commentary segment, which was initially presented by our old friend Paul Schindler.

Gary Kildall's Favorite Subject

In our first cold open, Cheifet shows off the movie *WarGames* being played off of a LaserDisc. Cheifet noted the film itself was used making a photographic process that was almost 100 years old. But these images were coming from a "virtually indestructible" laserdisc. Up until now, he noted, LaserDiscs had little to do with computers–but watch out, because the lasers were now coming for the PC.

Moving into the introduction, Cheifet and Gary Kildall pointed to another version of *WarGames*, this time played off of a Capacitance Electronic Disc (CED), which Cheifet described as already being a "dinosaur"–despite the fact it was touted by Kildall in a prior episode–that was no longer in production. So how could we then talk about a great future with video discs based on laser technology? Kildall explained that the CED was built like a phonograph record with a stylus and grooves. RCA had built the CED in an unsuccessful attempt to compete with the VCR, but the latter's success led to the demise of RCA's format. But laser storage was a completely different technology. It started with movies and was now being used for computer-controlled video, write-once devices, and offered phenomenal storage capacities for computers. Kildall enthused that laser disks were currently his favorite subject to talk about.

“The Ubiquitous Floppy Disk Is Not Yet an Endangered Species”

Wendy Woods narrated the B-roll footage, which mostly showed the production process for laser-based optical storage disks. She explained that the only similarities between optical magnetic disks were their circular shape and ability to provide random access of data. The biggest difference between the two was how much data could be stored. A 12-inch LaserDisc could store about 1 billion bytes, which equated to between 15,000 and 20,000 pages of text.

This enormous capacity did not come without some disadvantages, Woods noted. For now, these optical discs were restricted to read-only or write-once applications. And the initial mastering costs for such disks were high. Because the information spots on the optical disks were minute–about one-tenth the size of a particle of cigarette smoke–they had to be produced in a clean-room environment like those used to manufacture computer chips. The base material of the disc itself was polished glass sealed with layers of coatings. A high-intensity laser beam was then focused through an objective lens to mark the coating in small pits or bubbles, which formed the digital code, which could later be read back by a lower-energy laser.

Like the technique used to make phonograph records, Woods said, a master disk was struck from which a series of plates were formed. These were the molds for making copies. While the image source can vary, the disc stored information by scanning it much like a television camera. An image gateway compressed the picture and enhanced it for retrieval. With a high-resolution monitor, an excellent image could then be recalled from thousands in storage in about 8 seconds. And while Woods quipped, “The ubiquitous floppy disk is not yet an endangered species,” that could change given that a single 5-inch optical disc could store the same amount of data as 2,000 floppy disks.

Compact Discs in Computers by the End of 1985?

In the studio, Geoffrey Tulley of Pioneer Video, Inc., and Vladimir Langer of Sony joined Cheifet and Kildall. Kildall reiterated that laser storage technology was his favorite subject and joked that he had to remember to leave enough time for the guests to speak. He then explained the two different types of storage technology under discussion. The first was the LaserDisc that stored about 1.5 billion bytes of information, roughly the size of a law library. The other was the smaller compact disc (CD) that could hold about 10 encyclopedias on a single disc.

Kildall then asked Langer, the general manager for Sony's data products division, about the company's CD-ROM format. Langer explained the CD-ROM was made using the same process as audio compact discs. The only difference was that the CD-ROM contained digital data for computer processing. He showed a sample CD-ROM–containing the records of the previous year's Summer Olympics in Los Angeles–which he said could carry 540 MB of data.

Kildall asked about the drive used to hold the CD-ROM. Langer said the drive was a simple mechanism identical to that of the consumer audio CD player. It was packaged in a 5.25-inch floppy drive format. Kildall clarified it therefore looked like a floppy disk drive in a small personal computer. He also asked about the price. Langer replied the CD-ROM would be marketed at computer manufacturers rather than consumers, but he estimated the cost would be about 50 cents per megabyte. Kildall noted the cost was not really in the technology but in the information stored.

Cheifet followed up, asking when we would see an actual computer with this type of CD-ROM storage system. Langer said Sony planned to make evaluation units available to manufacturers during the first quarter of 1985. He said he expected to have a few major customers for the technology by mid-1985. Kildall said that meant we could see CD-ROM machines by the end of 1985.

Cheifet then asked Langer to clarify the major advantage of optical storage over magnetic disks. Langer said the main advantage was that the CD was virtually indestructible. It was also removable, which gave users tremendous value over a fixed hard disk, which was essentially captive inside the machine. And unlike a floppy disk, the CD could basically be mishandled and still remain perfect.

Kildall noted that since the CD-ROM was a read-only device, its main purpose was really to provide a source of information as opposed to archiving or backing up a computer. Langer replied that the market was still defining the application of the technology. He noted the CD-ROM had generated tremendous excitement with the Library of Congress and various publishers. The educational publication market in particular also anticipated a tremendous growth that would require higher capacity storage devices. Kildall remarked the CD-ROM could change the entire publishing industry.

Cheifet then turned to Tulley and asked him to describe his company's product, the Pioneer PX-7. Tulley explained the PX-7 was a microcomputer marketed by Pioneer in Japan. It used a format called MSX, a computer architecture and software standard used by a number of Japanese manufacturers. The Pioneer model featured a LaserDisc player as well as a full personal computer based on the Z80 microprocessor.

The PX-7's main feature was that it could combine images retrieved from the LaserDisc with computer-generated graphics. Tulley demonstrated a game on the PX-7, Sega's *Astron Belt*, a single-player space shooter. The computer generated the game action on top of video backgrounds retrieved from the LaserDisc.

Kildall clarified that this game did not require a ROM cartridge, cassette, or floppy disk–the data came right off the LaserDisc. Tulley said that was correct. This meant that when distributing games or educational programs, you could incorporate motion and still-frame pictures at full television quality. Kildall added another advantage was that you did not just have to watch a linear movie playing–the computer could actually go back and play segments, make branching decisions, and so forth.

Kildall noted that while *Astron Belt* was a game, there were hundreds of other applications for this type of system. He asked Tulley if he had any experience in other areas like education. Tulley said there were some people looking at making those types of applications. He noted the PX-7 itself was only marketed in Japan, where there was a very active LaserDisc industry that produced software like travel guides and encyclopedias. He said there was also an industrial market for the technology in the United States, especially for things like military simulators.

LaserDisc as an Artistic Medium

Between studio segments, Wendy Woods returned with a short remote feature on the “world’s first interactive video art game.” Lynn Hershman created *Lorna*, a story about a woman with agoraphobia who hadn’t left her house in 20 years. This was a live-action film presented on LaserDisc, but the viewer could “manipulate” the video in order to experience the “repetitive and repressed nature” of the main character’s life. Hershman told Woods that she considered the LaserDisc technology exciting due to the interactivity it provided.

Woods noted that Hershman was among the first artists to explore the LaserDisc as a creative medium; this was largely because the cost and availability of LaserDiscs created barriers that locked many other artists out of the market. Hershman said that as people saw what the possibilities were with this medium–and how much reality it would present–more people would use it and the audience would evolve.

Fictional Killer AI Inspired Video Game Console Prototype

Now we come to the final studio segment, which is undoubtedly the most remembered part of this episode. Joining Cheifet and Kildall were Rick Dyer and Jay Eagle. Dyer’s company, RDI Video Systems, was best known for producing the *Dragon’s Lair* LaserDisc video game in conjunction with animation director Don Bluth. Now Dyer was here to demonstrate a prototype for an actual LaserDisc-based video game console called the Halcyon.

Dyer said he named Halcyon after the HAL 9000–the fictional artificial intelligence featured in the 1968 film *2001: A Space Odyssey*. In the movie, Dyer said you could talk to HAL and it could talk back and recognize a person’s name and voice. HAL also had intelligence, which meant it could learn and control functions within its environment. Dyer said that was what Halcyon was all about. Kildall asked if that meant Halcyon had speech recognition, speech synthesis, and artificial intelligence. Dyer said that was correct.

Cheifet asked about the importance of the LaserDisc component to Halcyon. Did it just carry pictures or actual program logic? Dyer said both. It contained information where the computer was presenting the player with situations.

Cheifet then helped Dyer demonstrate a game developed for the Halcyon called *Thayer’s Quest*. Cheifet wore a headset with a microphone to show how to control the Halcyon using speech recognition. The initial exchange went well enough:

> Halcyon: DO YOU WANT TO PLAY THAYER’S QUEST?
>
> Cheifet: Yes.
>
> Halcyon: IF I HAVE YOUR VOICEPRINT, PLEASE SAY YOUR NAME.
>
> Cheifet: Stewart.
>
> Halcyon: NICE TO SEE YOU AGAIN, STEWART CHEIFET. CAN I CALL YOU STEWART?
>
> Cheifet: Yes.

Dyer claimed this was the most advanced speech recognition that had ever been put on the market. He said Halcyon had the ability to understand up to

200 words. Unfortunately, the speech recognition started to falter when Cheifet actually tried to play the game.

In *Thayer's Quest*, the player watches an animated story (similar to *Dragon's Lair*), and has to make several choices along the way for the main character. This should be as simple as speaking a number. But the Halcyon seemed to have difficulty understanding Cheifet. When he kept trying to speak option "1," the Halcyon asked him to repeat his answer several times, at one point admonishing the host, "SPEAK CONSISTENTLY, STEWART." Eventually, Cheifet gave up and selected option "2" instead, which seemed to be understood. Cheifet clarified that the player did not move linearly through the story–it branched depending on the decisions that were made.

Image from 'Thayer's Quest' of the player character encountering a wizard.

Kildall asked about what learning actually went on with the Halcyon. Dyer claimed the system learned about a user's strengths, weaknesses, and likes. He said that as you became involved with a program, the Halcyon would ask questions and learn about you and your personality.

I'll interject here to say that it's apparent to me from the video that Gary was not buying these claims, but he was too much of a gentleman to directly call Dyer out on television. Still, Kildall persisted with some follow-up. He asked if the Halcyon contained any genuine artificial intelligence–i.e., did the machine actually extrapolate anything beyond just recognizing the user's voice. Dyer said it learned based on your answers. Kildall retorted that it recognized the words that you spoke. But when a new user came in the Halcyon would have to be trained again using a separate set of words. Dyer said that was correct. Cheifet pointed out that he had started playing *Thayer's Quest* before the segment began and the Halcyon remembered his history from the previous session.

Cheifet then asked about the applications of Halcyon beyond *Thayer's Quest*. Eagle, an executive with Proton Corporation, said to continue the *2001* analogy, the next generation of Halcyon applications would allow the user to control their home environment–e.g., operate their audiovisual system, open and close doors–through the voice interface. (It's not made clear in the episode, but Proton apparently manufactured some–or most–of the components for the Halcyon prototype.)

There was then another exchange where Kildall made it clear this was not a machine with AI, although it might be a good starting point to develop something along those lines in the future. Dyer dug his heels in and insisted Halcyon already had AI, at least in the sense that it had the intelligence necessary "to be useful to consumers" along the lines of a robot. Kildall also didn't back down and emphasized this was just a really good starting point.

"Bach Never Sounded Better!"

In his commentary, Paul Schindler addressed the question of how far optical storage could go. He noted that audio compact discs were already rapidly replacing traditional vinyl records. Indeed, he'd recently replaced his own *Brandenburg Concertos* LP with a CD and that "Bach never sounded better!" Similarly, once optical discs became available as a computer peripheral, he would start replacing his floppy disks. And while you couldn't write to a CD like you could a floppy disk right now, he expected re-writable optical disc units would be available by the 1990s, At that point, floppy disks would then be about as popular as punched paper tape were today.

A Busy March for IBM

This episode's "Random Access" dates the broadcast at sometime in March 1985.

- IBM said it would stop production of its PCjr model, leaving about 300,000 machines orphaned. Although IBM said it would continue to support existing users, the company had not made it clear if it planned to introduce a new machine for the home market.
- Oakland-based Dynamical Systems planned to introduce Panorama, a new graphical window manager to challenge IBM's proprietary *TopView*, which it refused to license to PC clone manufacturers. Dynamical claimed Panorama ran faster than TopView, could handle 10 times as many windows, and only used about half the memory.
- IBM also continued its push into the software market with 22 new programs costing less than $150, with most priced under $20.
- Continuing a recurring "Random Access" thread, the Japanese government finally agreed to extend greater protection to U.S. software copyrights. The Japanese computer industry had been holding out for a limited copyright term of 15 years and mandatory licensing of U.S. software. But a new proposal allowed for a 50-year term with only limited domestic copying rights.
- IBM and Intel announced separate prototypes for parallel processing machines. IBM's Yorktown Simulation Engine boasted 512 microprocessors, while Intel said it had a concurrent computer with 256 microprocessors.
- NASA said it planned to acquire what would likely be the world's largest supercomputer for its Ames Research Facility in California. NASA said within 2 years its supercomputer would be running at 10 times the speeds of today's machines.
- Paul Schindler returned with his weekly software review, this time for *Be Your Own Coach*, a no-frills program that helped produce workout schedules for avid runners. The program cost $50 on the IBM PC and Apple II, and $39 on the Commodore 64. Cheifet added that running software was becoming more and more popular. There was even a program that featured dancing stick figures–perfect if you didn't want to watch Jane Fonda.

- Kodak announced plans to buy floppy disk manufacturer Verbatim for $175 million.
- A new study suggested introducing computers into the office did not lead to a reduction in jobs. The study showed 58 percent of firms surveyed did not cut their staff and in fact 12 percent actually added workers.
- Finally, Cheifet noted that it was now becoming trendy for rock groups to travel on the road with computers. He said that machines from Compaq, NEC, and IBM had been spotted in the dressing rooms of performers including Rick Springfield, Todd Rudgren, Styx, Jefferson Starship, and Tina Turner. The machines were used to handle tour costs, travel, and research on local radio stations.

Halcyon’s Failure to Launch

Neither of the two computers featured in this episode–the Pioneer PX-7 or the Halcyon–were ever sold in the United States. The PX-7 was only released in Japan and Europe. The LaserDisc player–a Pioneer LD-700 model–was a separate peripheral that actually was sold in the United States starting in 1983.

As for the Halcyon, it has become infamous as one of the greatest products that never made it to market. Although the Halcyon garnered a lot of enthusiastic early press during the prototype stage, the console never shipped a single retail unit. Simone de Rochefort explained in a 2018 retrospective for Polygon, that while the Halcyon’s may have foreshadowed a future dominated by voice-operated home automation machines like Alexa and Siri, Rick Dyer’s promised console was the wrong product at the wrong time:

> Halcyon was slated to come out in 1985, with a price tag of $2,500 for the voice-controlled model.
>
> You might recognize this as the worst time to release a home console. The home video game market had been plummeting since the 1983 crash, and in 1985, a once billion-dollar industry would be valued at just $100 million.

> Of course, 1985 was also the best time to release a console, if you were Nintendo. The [Nintendo Entertainment System], which had been out in Japan since 1983, finally made its way to North America that year.
>
> The base model was only $90.

Of course, it was probably clear to anyone who watched Stewart Cheifet struggle to use the Halcyon's voice control during the demo that Rick Dyer's console was more vaporware than revolutionary hardware. Indeed, Gary Kildall himself later described the entire Halcyon segment as "the biggest waste of videotape, computer, and TV cable time that I had ever seen." Writing in a manuscript for his unpublished memoirs, Kildall said his longtime co-host Cheifet "made a singular error" in booking Dyer and his prototype for the show. And even Dyer apparently knew things had gone poorly:

> The crew was going to lunch. so we broke down the set. and I was left alone with [Dyer]. He wanted to do the segment over, because he felt "it just didn't go right." I can't imagine how he could have come to this conclusion, do you?
>
> Tape's not rolling, and the set's hot lights are off. I patted [Dyer] on the back, and assured him that it would show well, but he should get HAL's feelings on it to make sure.

On a semi-positive note, Kildall said the entire debacle "showed that natural languages and computers are not a good fit, and that was worthwhile."

After Dyer's *Chronicles* appearance, his investors got cold feet and RDI was out of business by the end of 1985. Still, the pre-*Chronicles* hype for Halcyon was quite real. The November 1984 issue of *MicroTimes* contained an especially enthusiastic review of *Thayer's Quest* from Jina Bacarr, who played the game on a Halcyon prototype unit at RDI's offices in Carlsbad, California:

> With keyboard at my fingertips and headset resting securely on my hair (there went my thirty dollar styling, but it was worth it), I awaited

> with great anticipation as the story began to unravel before my eyes.
>
> After a detailed introduction to the story of Thayer and the Five Kingdoms, I was next treated to some of the most beautiful animation I've seen since Disney's *Jungle Book*. I was immediately taken by the style of the artwork, the audio variation of the many voices, and the well-defined characters. It was more than I expected–I really did feel that I was experiencing the action as Thayer. Of course, I got zapped a few times, and it did take some time before I caught onto the idea that some of the items presented to me were there for the taking and could be used to help me win the game.

Bacarr said she was so taken by the game and the Halcyon's voice interface that she returned to the RDI offices later that night and convinced the janitor to let her in so she could resume playing the adventure.

Another writer, John D. Gresham, wrote in a note accompanying Bacarr's article that while Halcyon was no doubt "ambitious," it would likely "have a way to go before it reaches into all of our homes." Similarly, Dan Persons, writing in the January 1985 issue of *Electronic Games*, said that Dyer conceded to him in an interview that the Halcyon's "prohibitive" price tag meant the console would "appeal mainly to the avant-garde electronics buyer." Consequently, Persons said most people would first see the Halcyon in an arcade, where *Thayer's Quest* would be "introduced as a keyboard-operated laser game."

In fact, *Thayer's Quest* had a life outside of the aborted Halcyon launch. The arcade version was marketed as a "conversion kit" for arcades that already had RDI's earlier game, *Dragon's Lair*. The game was later remade and sold under the title *Kingdom: The Far Reaches*, as a CD-ROM program for Macintosh, Windows, and MS-DOS computers in the mid-1990s. Dyer even managed to create and release a sequel, *Kingdom II: Shadoan*, in 1996.

Dyer himself currently works as a real estate agent in California, having left the tech industry at some point in the 1990s.

Notes from the Random Access File

- This episode is available at the Internet Archive.
- Geoffrey Tully remained with Pioneer until 1993, overseeing the company's CD-ROM and other optical disc products as a senior vice president. He's currently a technology consultant based out of Los Angeles.
- I'm not sure when the first CD-ROM drive actually made it onto the consumer market. Clint Basinger of Lazy Game Reviews published a video in July 2020 on the Hitachi CDR-1503S (also known as the Amdek Laserdrive-1), which came out in 1987 and retailed for $884. Basinger also demonstrated one of the earliest known CD-ROM applications, *Microsoft Bookshelf*, also released in 1987.
- Speaking of Microsoft, it was actually behind the MSX hardware-software standard used by the Pioneer PX-7. Tony Smith had an excellent write-up about the MSX project for *The Register* back in 2013.
- Wendy Woods–also known as Wendy Woods Gorski–was editor-in-chief of *Newsbytes News Network*, one of the first online publications covering the tech industry. It was originally launched on The Source, which I discussed back in Part 22 of this series.
- Lynn Hershman–now known as Lynn Hershman Leeson–remains a well-respected artist and filmmaker. Her interactive video piece *Lorna* was later acquired by the Whitney Museum of American Art.
- I could not track down any definitive information about our other two guests, Vlaidimir Langer or Jay Eagle, although Langer may have later served as a vice president at computer peripherals manufacturer Logitech.
- There was only one other known game developed for the Halcyon, *NFL Football*. Yes, this was apparently an NFL-licensed game. It was a LaserDisc port of an arcade game that used the older CED technology. The players selected plays, which were then recreated using actual footage taken from multiple games between the Los Angeles Raiders and the San Diego Chargers.
- The Sega game *Astron Belt* included footage from the movie *Star Trek II: The Wrath of Khan*.

- If this was the first time you’ve ever heard of IBM’s *TopView*, I’m with you. It was an attempt by Big Blue to preempt the coming of Microsoft Windows. But it didn’t fare much better than the PCjr. By 1987, IBM abandoned *TopView* in favor of its new OS/2 platform.
- The Kodak-Verbatim marriage didn’t last. Kodak sold Verbatim to Mitsubishi in 1990. Today the Verbatim brand is owned by Taiwan-based CMC Magnetics Corporation.

Chapter 2: Sargon III, Millionaire, and Ghostbusters

The original Macintosh would not seem like an obvious gaming machine. It retailed for $2,500 at the time of its January 1984 release. You could have bought a dozen Atari 2600 consoles for the same amount of money. And while the Macintosh did boast high-resolution bitmap graphics–as well as the ability to display multiple windows–it came on a 9-inch monochrome display. Even the lowly Commodore 64 could display 16 colors, and use an ordinary television set to boot.

Still, Apple was determined to avoid a repeat of the Lisa's failure by ensuring the availability of third-party software for the Macintosh platform. Games were an obvious candidate. To that end, this next *Computer Chronicles* episode featured two of the earliest entertainment offerings for the original Macintosh–as well as a look at one of the most iconic games for the more popular Commodore 64.

Would Computer Games Stumble Like Video Game Consoles?

Stewart Cheifet's cold open featured him standing in an electronics store holding up a retail version of the legendary Atari 2600 game *E.T. the Extra-Terrestrial* video game. Cheifet said that video games had come on hard times these days with closeout sales and discount prices just about everywhere. But what about *computer* games? As computers have gotten better, Cheifet said, so have the games, which boasted vastly improved graphics, much more sophisticated text handling, and greater speed.

In the studio introduction, Cheifet and Gary Kildall demonstrated the Milton Bradley Grandmaster (also known as the Milton Bradley Phantom), a chess-playing computer that could actually move the pieces on its own using magnets and a robotic arm concealed underneath the board. Cheifet noted that computer games drove much of the early personal computer revolution, but some people were now saying that computer games were actually dying. Kildall quipped that from the looks of the automated Grandmaster chessboard, it may be the game *player* was a dying breed. But seriously, Kildall said he did not think the market for computer games was dying. Rather, the market had settled down to a group of dedicated game players and those players now expected fairly sophisticated games.

Adapting Film Animation to Computer Game Design

Wendy Woods then presented her first remote piece of the episode, which explained how traditional animators were now moving into computer game design. Over some B-roll of a game under development–it appeared to be the 1985 Broderbund release *Captain Goodnight and the Islands of Fear*–Woods noted that the early art of animation had grown up alongside the motion picture industry. It was based on storyboards, character development, and a detailed script. This was a repetitive and time-consuming process. But today, many of these tasks could be computer assisted, which had great potential for the field of computer games.

Woods explained that a game designer could dream up a character, give them a personality and lifelike moves, and quickly bring their paper sketches to life on the screen. Using a light pen, the artist could adjust each pixel on the screen to give their character fluid movements. All of the critical game elements, from game action to the backgrounds, could be drawn on a graphics pad, tested, and changed instantly.

To create an explosion, for example, Woods said the animator first determined the shape and size of the blast before building a sequence. After checking the result, the animator could then place the explosion precisely within the scene. But in spite of electronic aids, the present-day designer was still faced with a monumental challenge–to transfer the personality of an invented character from the full-size drawing pad to the tiny pixels on a video screen. This required finesse and detail.

For instance, when the hero of the game was introduced, the animator wanted his movements to be quick and bold. But when faced with adversity, the hero’s mood reflected it and he would slink away with slumped shoulders. To most players, Woods said, this might not seem like a major step forward, but it resembled the methods used to make traditional animation lifelike. The more plastic and fluid the movement, the more realistic the action. How much of this realism could be transferred to the electronic game board remained to be seen.

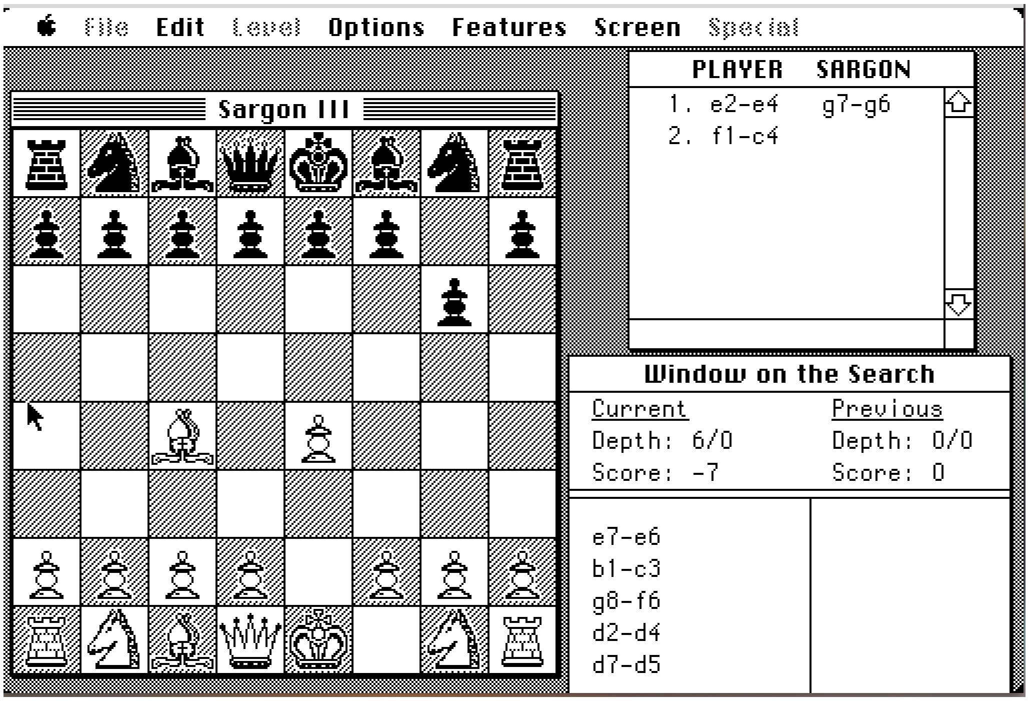
Using Your Mac to Play Chess…and Simulate Stock Transactions

Back on set, Kathe Spracklen and Jim Zuber joined Cheifet and Kildall. Spracklen was the co-writer and designer (along with her husband, Dan Spracklen) of *Sargon III*, a chess program available on the Macintosh. Kildall noted that one of the amazing things about computer chess games was that 15 or 20 years ago it was essentially a research topic and today you could walk into Macy’s and buy a tiny chess computer. Kildall asked what allowed that to take place. Spracklen replied it was obviously the microcomputer revolution, i.e., the existence of a single-chip computer. It was like if a new mountain sprung up and all of the mountain climbers would rush to it–the same was true, she said, for programmers when a new microprocessor came out.

Kildall asked Spracklen about the process of constructing a computer chess program. Spracklen replied that as with any big project, you had to break it down into manageable steps. For *Sargon*, Spracklen said that meant dividing the program up into three separate components: (1) move generation–how did you get the machine to understand what is pawn move, a queen move, *et al*.; (2) evaluation–now that you can make moves, which are good or bad, and how fast can the computer calculate its options; and (3) graphics displays and user interface.

Kildall noted that the Macintosh offered a very graphical interface. Was that a big change versus developing *Sargon* for earlier machines? Spracklen said it was a big change and a “delightful” one at that. She said working with the Macintosh was like presenting a kid with a mountainous ice cream sundae–it was everything you ever wanted in a computer but never had before.

Cheifet asked Spracklen how she directly used the Macintosh to augment *Sargon*? Spracklen said that in prior versions, the player had to type in their moves using traditional chess notation. Now, the Macintosh allowed the player to simply use the mouse to move the pieces. Indeed, aside from naming a save file for a game, the player never had to touch the keyboard.



```
PLAYER   SARGON
1. e2-e4  g7-g6
2. f1-c4

Current          Previous
Depth: 6/0       Depth: 0/0
Score: -7        Score: 0

e7-e6
b1-c3
g8-f6
d2-d4
d7-d5
```

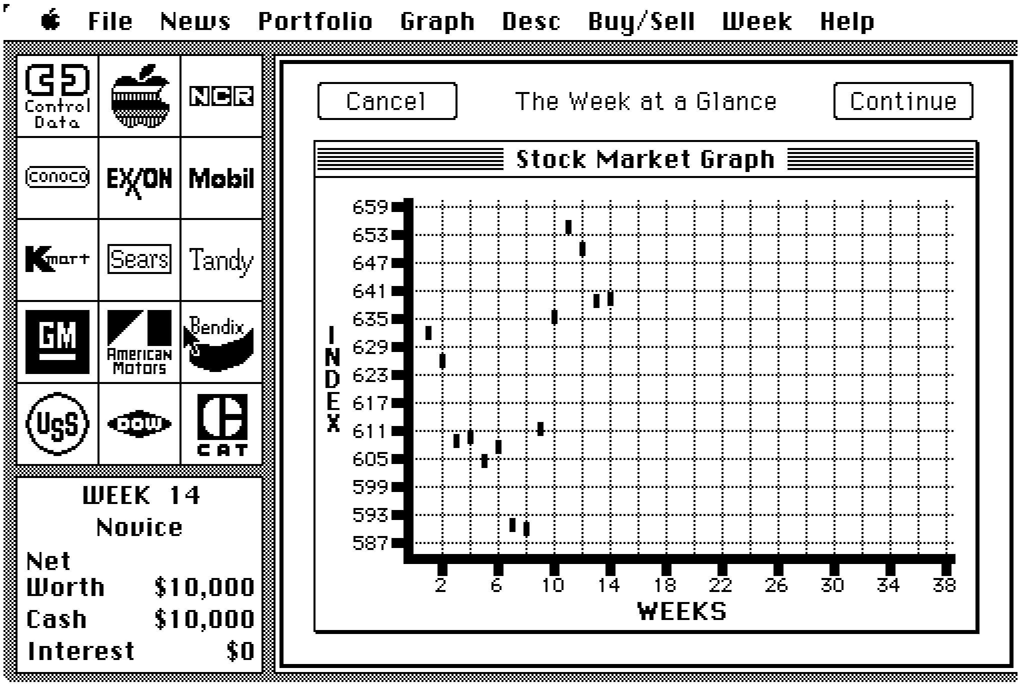
Game screen from Sargon III for the Macintosh, featuring a chessboard, a list of player moves, and a search window.

Kildall asked how *Sargon III* fared against good chess players. Spracklen said it beat the majority of tournament-level chess players and the vast majority of casual players. However, a world champion chess player would have no difficulty beating the program–*Sargon III* might beat such a player once in 100 games, she said. Kildall asked if Spracklen herself could beat the game. She said she could on the lowest level.

Cheifet asked how *Sargon III* made improvements over its predecessors, *Sargon* and *Sargon II*. Spracklen said each version involved a complete rewrite of the chess-playing algorithm. Each version also represented a tenfold or better improvement in speed. In practical terms, it took the computer 2 or 3 minutes to make a move in *Sargon II*, but in *Sargon III* It was more like 5 or 10 seconds.

Cheifet then turned to Zuber, who designed a game called *Millionaire* for Blue Chip Software. Zuber explained his game was a stock market simulation. He said that after doing some consulting work a few years earlier, he'd taken his money and invested in stock options. He learned an awful lot about how the market worked–although he lost half of his money. Around that same time, the IBM Personal Computer was coming onto the market. Figuring that the type of person who would buy a PC was likely an upwardly mobile individual concerned with their net worth, Zuber decided to write his simulation. Later, about 6 months before the release of the Macintosh, Zuber said Apple came to him and asked about a version for its new machine. A couple days after that, a programmer who had spent the past year programming the Macintosh for the accounting firm Peat Marwick offered his services in porting the software.

Zuber then gave a brief demonstration of *Millionaire*, which made heavy use of the Macintosh operating system's menus and windows. The basic premise of the game was fairly simple: The player could invest in 15 different stocks (all real-world companies) representing 5 different industry groups and track their portfolio over time. Kildall asked if this would actually make someone a better investor. Zuber said it would not, although it could help teach you how to avoid certain mistakes.



WEEK 14

Novice

Net Worth $10,000

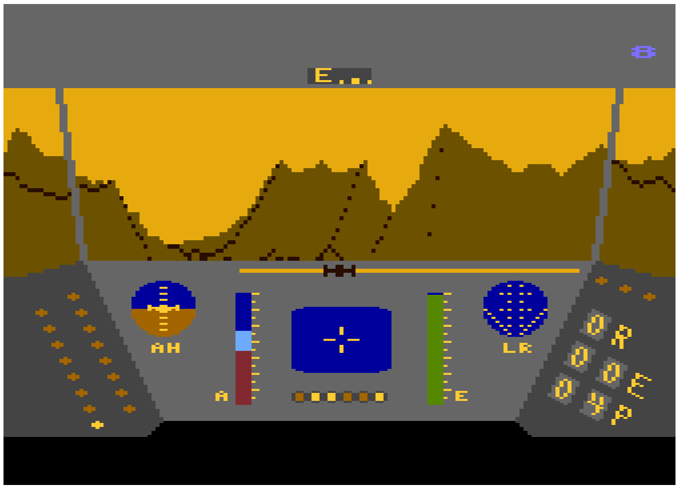
Cash $10,000

Interest $0

User interface from “Millionaire” for the Macintosh.

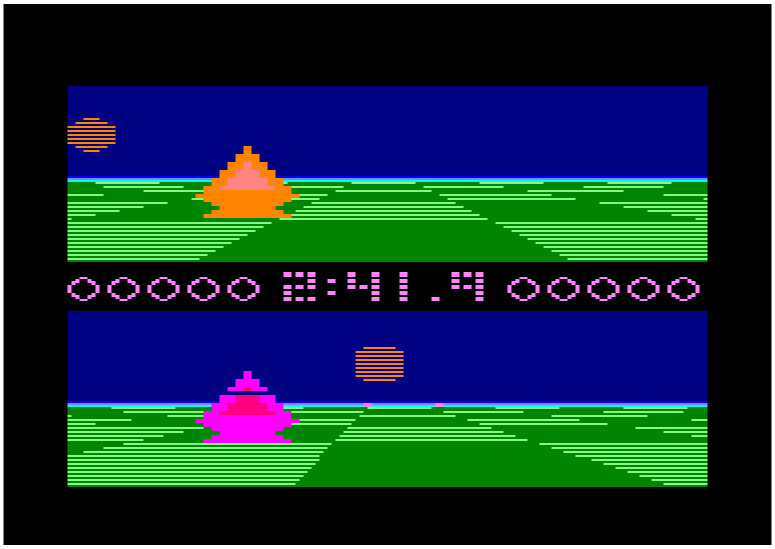
LucasFilm Enters the Computer Game Market

Before the final in-studio segment, Wendy Woods returned with her second remote feature, this time focusing on the first computer game releases from George Lucas’ LucasFilm. The first game, *Rescue on Fractalus!*, was a first-person aerial combat shooter where “space, form, mass and velocity are seen to be true to life.” LucasFilm designer David Levine told Woods the game was based on a geometrical formula known as the *fractal*, which measured the altitude at various points and then used a repeatable technique for generating the craggy or rocky edges to create the game’s mountainous playing field.



Screenshot from LucasFilm’s “Rescue on Fractalus!” featuring a cockpit point of view as the player flies near a mountain range.

The second game, *Ballblazer*, was designed by Levine to be a kind of space-age hockey that featured a split screen showing both players’ point of view. Woods said the edges of the diagonal playing field appeared to be smooth thanks to a technique known as *anti-aliasing*, which blended five different colors at certain grid points. Woods noted it took LucasFilm designers about a year to complete both of these games. David Fox, the designer of *Fractalus*, said that at LucasFilm they did not have a marketing organization “beating down their necks” telling us to get a game done in 3 weeks. They were simply told to do the best they could do and push the technology as far as they could. Woods ended by noting that LucasFilm's next games would target the newest low-end personal computers.



Screen shot from "Ballblazer" by LucasFilm, showing the two-player split-screen point of view.

From Text-Based Adventure Games to Movie Tie-ins

Back on the set, David Crane and David Lebling joined Cheifet and Kildall. Lebling authored a number of text-based adventure games, notably the *Zork* series, for Infocom. Kildall asked Lebling to explain what made an adventure game interesting, particularly in a world that was now moving towards graphics. Lebling said the human brain could do a much better job of creating the pictures than a computer could with today's technology. That was why all of Infocom's games were text.

Kildall followed up, asking if the games were getting more sophisticated now. Lebling said they were, to the point where they weren't even mostly played by children anymore. He noted the appeal of adventure games did not fade with age, and a lot of adults still enjoyed them. He also explained that unlike the earlier adventure games, which relied on simple "branching" techniques, today's programs could recognize much more complex directions and verbs. The player could talk to other characters inside the game and even ask fairly complicated questions such as, "Where were you on the night of the murder?"

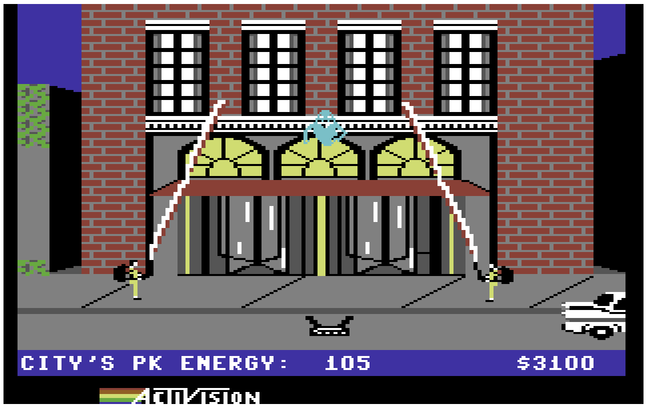
Cheifet mentioned he was a fan of the old Scott Adams adventure games that involved very simple commands like "GO NORTH" or "DROP BOX." He noted that Infocom had come a long way with games such as *Zork*. Cheifet asked what made today's games so much better. Lebling said that Infocom had an extremely good development system and parser built into its games. The parser could now understand more complex sentences. And the more sentences the game could understand, the more complicated and exciting the action in the game itself.

Cheifet then turned to David Crane, a game designer and co-founder at Activision. Cheifet noted Crane was known for graphics-based video games like *Pitfall*. Did Crane think that computer games would suffer the same fate as video games, or were computer games a different animal where consumer interest wouldn't die? Crane replied there were going to be several different classifications of games going forward, such as adventure games, strategy games, and arcade games. One of the most difficult aspects of the industry right now, he said, was categorizing games due to crossover. For example, his newest game *Ghostbusters* was an action game. But unlike earlier action games that took place on a single screen, there were several different screens involved in *Ghostbusters*

Crane then demonstrated *Ghostbusters* on a Commodore SX-64 (a portable version of the Commodore 64 with a built-in display and disk drive.) The game opens with a title screen playing the theme song from the 1984 movie upon which the game is based. Cheifet joked it must have taken Crane as long to do this title screen as the rest of the game. Crane said that wasn't really true; he actually waited until the final week of development.

Cheifet pointed out that up until now, computer games were noted for their innovation. Did it concern Crane at all that *Ghostbusters* was simply repackaging a movie? Crane said he was not concerned by that. In fact, he began work on this game before the movie ever came out. What his initial game lacked, however, was a theme. So when Activision and Columbia–the studio that released *Ghostbusters*–decided to get together, Crane said he saw it as an opportunity to lend a theme to his game. But he added that many people had told him they would enjoy playing *Ghostbusters* even if it didn't tie-in to the film.

Crane then continued to demonstrate some of the features in *Ghostbusters*. The game starts by asking if the player has an “account number.” This was an early type of password system where a player could start the game with the same amount of cash that they did following their last session. If the player did not have an account, they started out with funds loaned from the bank. The player then had to purchase a car and ghost-hunting equipment. The main game play involved driving around a city to various locations where the player would then try to capture ghosts.



Screenshot from “Ghostbusters” for the Commodore 64 by David Crane, featuring two ghostbusters trying to catch a ghost in front of a building.

Finally, Cheifet asked Lebling about what he saw as the next challenge in adventure games. Lebling said he expected games would start moving away from straight puzzle solving and into something more akin to the plot of a novel.

No Substitute for Human Interaction

Paul Schindler’s closing commentary for the episode attempted to throw a bit of cold water on the growing popularity of computer games. He presented his commentary lying on the floor of his house while his daughter played the board game *Candy Land*. Schindler noted the board game was good for improving his daughter’s color identification and verbal skills–as well as teaching her not to cheat. Could a computer game do that?

Schindler said he knew computer games had a good side–indeed, he reviews computer games–but we had to consider the social effect of replacing other kinds of games with the computer. For instance, he said he offered covered industry conventions in Las Vegas, where he also liked to play blackjack. Would you rather play that game with people or the computer? Schindler said he preferred the interaction and learning you got from playing with people. And it would be a long time before the computer could offer that same degree of human interaction.

GM Announces Its First Computer in a Car

Stewart Cheifet presented the *Random Access* segment following this episode:

- Grid Systems, known as the "Porsche of lap portables," announced a new line of computers starting at about half the price of the company's existing Grid Compass. The new lineup would let customers pick the type of screen they wanted based on "readability vs. power consumption." Grid would offer both LCD and Plasma displays. Cheifet said Ericsson, Kaypro, and Morrow Designs all planned to release new portable PCs as well during 1985.
- New software called the Spinal Health Data Program now allowed doctors to digitize X-rays into high-resolution graphics using an IBM Personal Computer.
- A company called Defracto–I may have the name wrong–planned to release a new line of "robots with eyes." Specifically, the robots used solid-state video cameras, strobe lighting, and computerized wraparound lasers to sort through up to 10,000 objects per hour and spot any imperfections.
- In more new computer news, Tandem Computers said it would unveil a line of "low-cost failsafe minis" to run in offices.
- Paul Schindler returned for his weekly software review. This time he reviewed what a freeware program called *Free Will*, which was published by the San Francisco PC Users Group to help people write their own wills. Schindler noted the freeware model was the "opposite of copy protection," in that users were encouraged to copy and

distribute the program without permission. Satisfied users were encouraged to pay a $6 registration fee.

- General Motors said the 1986 Buick Riviera would come with a full onboard computer–including a touch-sensitive CRT display on the dashboard–that would oversee about 100 different functions inside the vehicle.
- A company called Amfit announced a new process that used computers to help build custom shoes for customers.
- Finally, Cheifet noted there was growing interest in replacing the traditional QWERTY keyboard with the Dvorak layout, which proponents claimed resulted in 50 percent faster typing speeds. Nevertheless, with 30 million QWERTY boards already in use, Cheifet said prospects for a quick change were dim.

Spracklen's Journey from Early Computer Chess to Sewing and Crafts

As I mentioned in my introduction, Apple was keen on having third-party software available for the Macintosh. Kathe Spracklen discussed the process of bringing *Sargon III*–which was originally written for 6502-based machines–to the Motorola 68000-based Macintosh in a 2005 interview conducted by Gardner Hendrie for the Computer History Museum:

> When the Apple Macintosh computer came out, Apple pre-released some development systems with people who had successful products, in the hopes they would get their programs running on the new Macintosh computer. Now, we weren't in the first round. But just a couple weeks before they announced the Macintosh, or maybe a couple of months, one of the developers dropped out. And so Apple contacted us and said would we like to put our Sargon on a pre-release Macintosh? So we took it on, and we did it. And we translated the entire program into 68000 [assembly language].

Spracklen said *Sargon III* ended up becoming the "first third-party executable software program for the Macintosh." Interestingly, Specklen said Apple co-founder Steve Jobs wasn't interested in *Sargon* when they initially met at the second West Coast Computer Faire in 1978. That event marked an important point in the development of *Sargon*, as the game–originally designed by Spracklen's husband, Daniel–managed to win a contest held among various computer chess programs.

The Spracklens originally developed their chess program for a Z80-based computer called the WaveMate Jupiter II, which cost them nearly $4,000, representing their total savings at the time. Dan Spracklen built the original chess algorithm, while Kathe Spracklen programmed the machine's graphics.

After *Sargon* won the West Coast Computer Faire tournament, Kathe Spracklen said someone from the journal *Byte* approached her about writing a series of articles for the magazine about the program. The published articles included a plug for people to buy *Sargon*–not an actual disk or cassette tape, mind you, but a printed listing of the source code. Daniel Spracklen said he and Kathe "were putting [*Sargon*] into a bound copy and Xeroxing it, and just selling that for $15.00."

Eventually, Hayden Books agreed to publish the *Sargon* code as an actual book. Kathe Spracklen noted when she went to look at the "computer section" of her local Barnes & Noble, the only two books available were hers and a guide to building your own robot. Hayden Books later established a software arm that actually published the later *Sargon* games as commercial software.

During this time–and in fact, up until the early 1990s–both Spracklens worked full-time for Fidelity Electronics, a company that initially made its mark selling hearing aids and biomedical products but later pivoted to making dedicated chess computers, most of which were designed by Dan and Kathe Spracklen. The machines proved successful, winning the first four World Microcomputer World Chess Championships.

After leaving the world of computer chess, Kathe Spracklen went to work for a researcher studying the causes of juvenile delinquency. After helping to publish a number of papers on that subject, Spracklen briefly taught programming at a community college in Oregon. She then went to work developing software for a distributor of sewing crafts and supplies, which she described to Hendrie as "the love of my life."

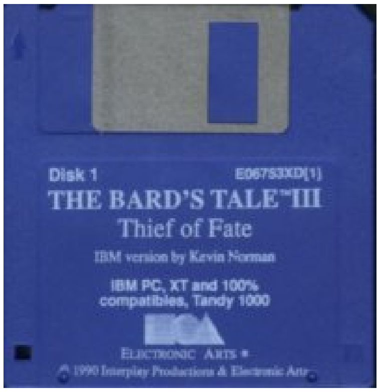
Notes from the Random Access File

- This episode is available at the Internet Archive and has a broadcast date of January 21, 1985.
- Starting with this second season WITF-TV, the public broadcasting station in Harrisburg, Pennsylvania, now co-produces *Computer Chronicles* with KCSM-TV in San Mateo, California. This coincided with Cheifet taking over as WITF's president and chief executive, a post he would hold until 1993. Going forward, we will see some WITF personnel presenting "Random Access" and some remote segments.
- The MB Grandmaster seen during the introduction is actually based on a variant of the 6502 microprocessor that was used in many early personal computers, including the Commodore 64 and Apple II.
- All roads apparently lead to Activision: David Lebling's Infocom merged into David Crane's Activision in 1986. Activision kept Infocom going as a separate division until 1989. Meanwhile, Hayden Software, which published Kathe Specklen's *Sargon III*, was sold off to Spinnaker Software, who in turn later sold it to–you guessed it–Activision.
- Not long after this episode aired, Jim Zuber left Blue Chip Software and co-founded Genoa Technology, a software testing company, which later became known as QualityLogic. Zuber remains affiliated with that company to the present day.
- As for Blue Chip Software, it produced three other business simulation games in the early 1980s–focusing on financial planning, commodities, and real estate, respectively–but seems to have disappeared into the ether after doing a second release of *Millionaire* in 1987.
- Some of the 15 companies used in *Millionaire* are now defunct, including Control Data Corporation, which I discussed back in Part 25.
- Dave Lebling apparently left the computer games industry after the demise of Infocom. He recently retired after a long stint as a senior principal software engineer for BAE Systems, a United Kingdom-based defense contractor.

- Of today’s four guests, only David Crane stuck with computer game design. He did leave Activision in 1986 to co-found Absolute Entertainment, where he developed *David Crane’s Amazing Tennis* and *Bart Simpson’s Escape from Camp Deadly*, among other games. Most recently, Crane and longtime collaborator Garry Kitchen released *Circus Convoy*, a brand new game for the Atari 2600, through their Audacity Games label.
- Crane also provided a more detailed explanation of the “account number” password system for *Ghostbusters* as part of an August 2020 video posted by Christian Simpson on his Retro Recipes YouTube channel.
- I wonder if the comment from LucasFilm’s David Fox about not being pressured into making a game in three weeks was a veiled shot at Atari’s infamous release of *E.T.*, which was famously designed in just five weeks.
- Paul Schindler’s disdain for computerized blackjack seems to be at odds with his earlier positive review of *Ken Uston’s Professional Blackjack*.
- Tandem Computers was primarily known for making “fault-tolerant computer systems,” i.e., computers used in ATMs and switching centers. The personal computer line mentioned by Cheifet would be known as the Dynamite PC. It apparently fizzled on launch.
- On the other hand, Amfit would find success in the area of computer-aided custom shoe design. The company remains in business to this day.
- GM did release the 1986 Buick Riviera with a computer. Known as the Graphic Control Center, the 3x5 CRT display allowed the driver to adjust the car’s climate control and radio, as well as access a variety of diagnostic systems, according to a 1986 article in the *Christian Science Monitor*.
- Still waiting for the Dvorak keyboard to make its move. Any day now…

Chapter 3: The Tandy 1000 and Compaq Portable

Purchasing software in the late 1980s often required the buyer to carefully read the label, especially if you owned a personal computer that purported to be "compatible" with IBM. Take this diskette for the IBM port of *The Bard's Tale III: Thief of Fate*:


Disk 1
E067S3XD(1)
THE BARD'S TALE™ III
Thief of Fate
IBM version by Kevin Norman
IBM PC, XT and 100% compatibles, Tandy 1000
ELECTRONIC ARTS
© 1990 Interplay Productions & Electronic Arts

3.5-inch floppy disk of "The Bard's Tale III: Thief of Fate" for the IBM and compatible PCs.

As you can see, the disk label states the game works with the "IBM PC, XT and 100% compatibles," as well as the Tandy 1000. Tandy is the only compatible listed by name, as by this point–this was a 1990 release–the 1000 line was widely considered the gold standard for IBM compatibility.

This brings us to our next *Computer Chronicles* episode from January 1985, which focused on the Tandy 1000 and the state of the market for IBM "clones" or "lookalikes." In the cold open, Stewart Cheifet stood in a computer store next to an IBM Personal Computer XT–the direct successor to the original PC–and noted the machine sold for around $4,000. He then showed off some of the IBM "clones" and said they typically cost less than the IBM computers yet claimed to run all of the same software.

In the studio, Cheifet said that when people asked him if they should buy an original IBM or a lookalike, his answer depended a lot on compatibility. But what does "compatibility" mean? Gary Kildall replied that in the case of hardware and software, compatibility meant that two things did the same thing–or more. That can be both a good and a bad thing. He noted that over 10 years ago, IBM set certain standards, such as the use of 8-inch floppy disks to distribute software. Today, there was a more complex situation where people were trying to emulate both IBM's hardware and software. The whole industry was now effectively chasing the changes made by IBM.

Cloning Your Own IBM PC

Before getting to demonstrations of popular mass-market IBM clones, Wendy Woods presented a report on how some people built their own PC lookalikes. Over footage of an unidentified man building a PC clone, Woods explained that despite the IBM logo prominently displayed on every PC case, very few parts inside the machine actually came from Big Blue. In fact, she added, over 95 percent of the IBM PC was produced outside of the company. Aside from the motherboard, case, and power supply, the components came from many diverse sources, including Hitachi and Texas Instruments.

But why build your own PC? Woods asked. In becoming more "intimate" with the machine, she said, the user could learn about hardware functions and compatibility. More importantly, the do-it-yourself approach could save you about $1,000. Parts were cheap and could be picked up at a local electronics store. There were also manuals explaining everything from DIP switches to semiconductors. Woods noted the typical user would probably spend a great deal of time reading before doing any actual building.

Woods said there were other advantages to a DIY approach. If the user didn't like the stock hardware, they could make their own improvements, such as installing a faster chip or a better disk drive, again for less money. The open architecture design of the PC made that possible. So should you build your own clone? Woods said it depended on whether you could trade time for money. The PC project demonstrated in the B-roll footage took about 2 weeks to complete–not including about 100 hours of research. But for a user willing to do some reading, and shopping, Woods said the advantages were undeniable.

Could Tandy Threaten IBM's Dominance?

Ed Juge and David Bunnell joined Cheifet and Kildall for the first studio roundtable. Juge, the director of market planning for Tandy/Radio Shack, was there to demonstrate the Tandy 1000, a clone of the IBM PCjr. Kildall opened by pointing out that IBM had created a situation much like the mainframe industry where it set the standards that other people followed. In the last couple of years, that allowed IBM to take a significant piece of the PC market. So if IBM set the standard, why would anyone buy from a company other than IBM? Juge replied that the Tandy 1000 offered a price-performance advantage that IBM could not match. The 1000 was compatible with the PC but included the graphics and sound enhancements that were normally available on the PCjr.

Cheifet said the Tandy 1000 was advertised as a "mirror image" of the IBM PC. Did that bother Juge? Juge clarified that another model, the Tandy 1200, was actually the mirror image of the IBM PC XT. The 1000 was not a mirror of the XT as such. Cheifet retorted that this was a general notion, and what did it mean for the industry to simply advertise everything as being like an IBM. Juge held his ground and said Radio Shack did not advertise the 1000 as being exactly like the IBM. They were trying to leverage off the popularity of IBM's operating system–MS-DOS–and all of the software available for it. But they were not trying to do everything that IBM did.

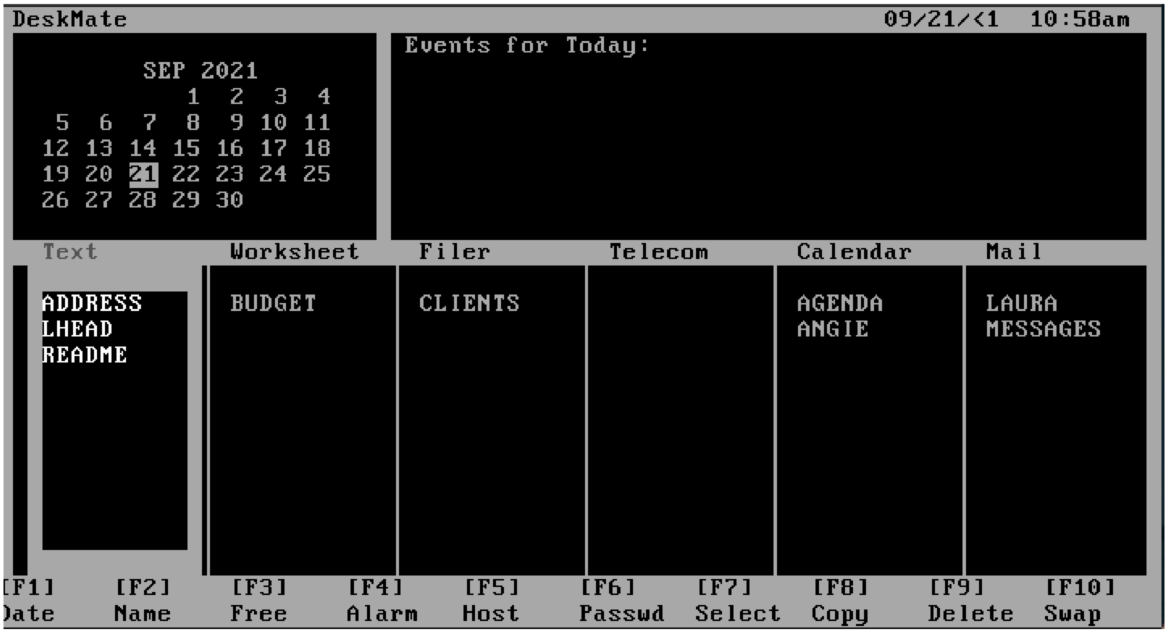
Kildall said the IBM provided a base level that companies like Radio Shack were trying to enhance. Juge said that was right, they were bringing something else to the party. Kildall pointed to Compaq's popular IBM compatible, which offered a degree of portability that the XT could not.

Cheifet turned to Bunnell, the publisher of *PC World* and *Macworld* magazines, and asked if the "obsession" with IBM compatibility was good or bad for the industry. Bunnell noted that first off, a truly successful compatible offered something different than an IBM PC rather than just a mirror image. That is why the Compaq was successful and there was a lot of excitement about the Tandy 1000. Bunnell further agreed with Juge that the important thing was that a compatible had to run the same software base. He also conceded Cheifet had a point in that if there was only one standard that everyone adhered to, it tended to inhibit creativity and innovation.

Kildall asked about the biggest potential threat to IBM's position. Could any of the clones actually capture significant market share? Bunnell said he did not see any particular threat to IBM's position. He did not anticipate a decline. But he noted that personal computers were used for so many different tasks that there was room for many different kinds of PCs. IBM could not cater to all of these users.

Kildall noted that if a clone was offering a popular feature, such as portability, IBM could still go in and take that market for itself. Bunnell agreed, noting that was the danger of playing the IBM compatible game. They had great efficiency in manufacturing and could come in and lower prices at any moment. That's why some other compatible companies like Columbia Data and Eagle had fallen on hard times.

Cheifet turned to the issue of software. Specifically, he asked Juge about *DeskMate*, a bundled software package included with the Tandy 1000. If the main selling point of the 1000 was compatibility with IBM programs, then why does it come with its own software? Juge explained that Tandy actually built several families of computers. The IBM compatibles–or more accurately, the MS-DOS compatibles–were just one family. For example, Tandy also marketed a multi-user system based on Xenix, Microsoft's UNIX-based operating system.



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DeskMate                                                    09/21/<1  10:58am
         SEP 2021             Events for Today:
             1  2  3  4
   5  6  7  8  9 10 11
  12 13 14 15 16 17 18
  19 20 21 22 23 24 25
  26 27 28 29 30
  Text        Worksheet    Filer       Telecom     Calendar    Mail
  ADDRESS     BUDGET       CLIENTS                 AGENDA      LAURA
  LHEAD                                            ANGIE       MESSAGES
  README
[F1]    [F2]    [F3]    [F4]    [F5]    [F6]    [F7]    [F8]    [F9]    [F10]
Date    Name    Free    Alarm   Host    Passwd  Select  Copy    Delete  Swap
```

User interface for Tandy's DeskMate.

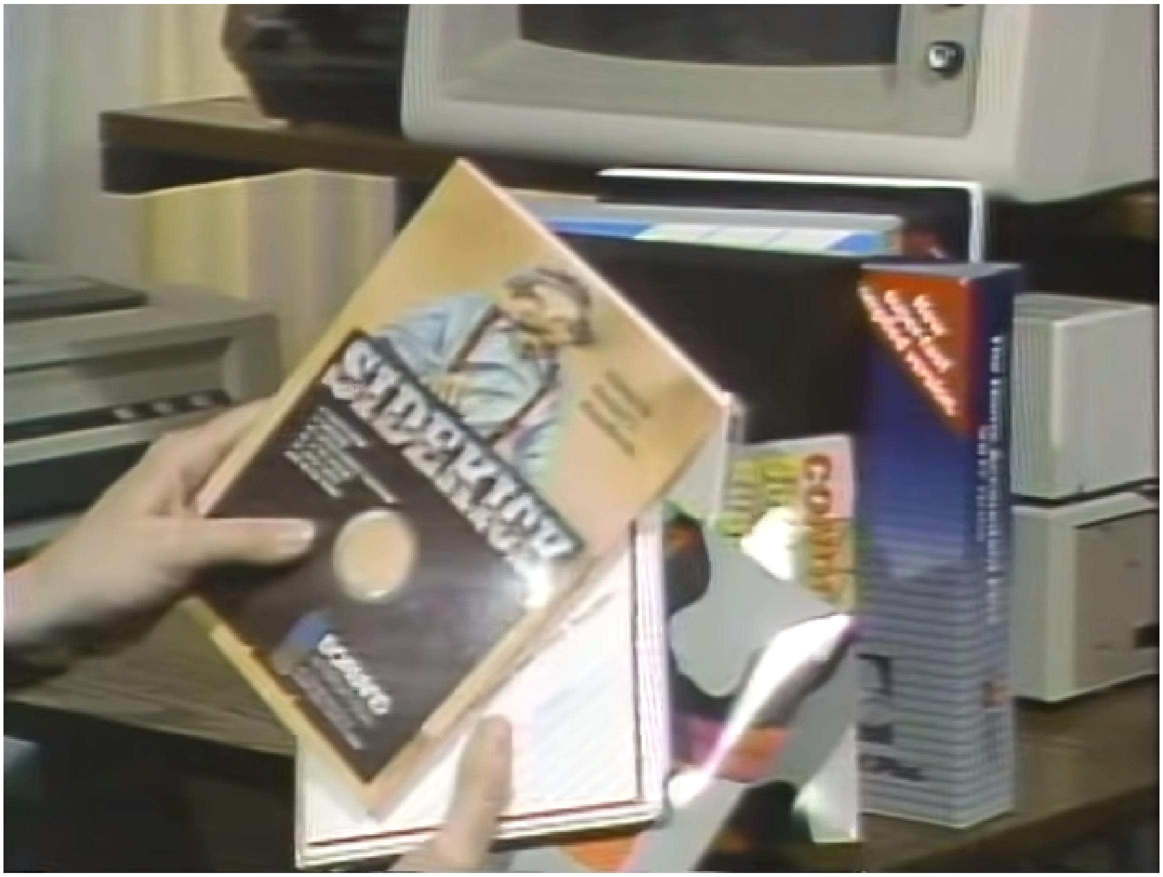
As for *DeskMate*, Juge said, it was a combination of six different applications–a text processor, worksheet, database, telecommunications, calendar, and electronic mail–that gave the user something to have immediately when they took the computer home. It also provided an easy way for Radio Shack salespeople to demonstrate the product, as *DeskMate* was available on all Tandy computer lines. And it was just nice to have something you could bundle with the computer that gave it some additional value.

Cheifet asked about the Tandy 1000's compatibility with two popular IBM PC programs, *Lotus 1-2-3* and *Microsoft Flight Simulator*. Bunnell demonstrated that *Flight Simulator* loaded just fine on the Tandy 1000. He explained that both *Flight Simulator* and *Lotus* called upon the machine's BIOS, which was separate from the operating system and stored in the computer read-only memory (ROM). A real compatible like the Tandy 1000 therefore had to emulate that BIOS code without simply copying IBM's software. That is why these programs were a common test for compatibility.

Cheifet concluded the segment by asking Bunnell about IBM's strategy going forward. Did they really care about the clones? Bunnell said IBM's approach was to have an open system that encouraged development of a lot of software for their computers. And as they increased the number of machines manufactured and improved the efficiency of their distribution system, IBM would then lower prices and take a bigger piece of the action. It would be foolish, Bunnell said, to think that IBM would not remain highly competitive and want to dominate the market, because they do.

IBM Not Fully Compatible with IBM

In her second report for the episode, Wendy Woods looked at issues of compatibility within the IBM computer line itself. She noted that IBM claimed the PCjr could run over 1,000 programs designed for the original PC. While she couldn't test all of them, she did test a random selection of eight programs on an PCjr with 384 KB of RAM and a Legacy expansion unit.



Wendy Woods holding a random assortment of IBM Personal Computer software.

Half of the eight tested programs worked on the PCjr, Woods said, and half did not. Jim March, a computer salesman who assisted with the testing, told Woods that the first problem was the graphics display. One of the test programs, *SPOC Chess Master*, crashed in the middle of opening its graphics screen. Another program, Borland's *Sidekick* came in two versions, one with copy protection and one without. Only the non-protected version worked with the PCjr.

March identified two other issues with PC-PCjr compatibility. The first was timing–anything involving the use of the computer's clock could mess the software up. The second was conflicts created by where the software developer decided to load their program into memory. This was an especially "insidious" problem, March said, because there was no single way for the user to detect or guard against that problem.

The takeaway from this test, Woods said, was that consumers should make sure they see a program running on a PCjr in the store before buying it. And more importantly, make sure you can get a refund if the software proved to be incompatible.

The Legal Status of IBM Clones

For the final studio segment, Woody Liswood and David Grais joined Cheifet and Kildall. Kildall asked Liswood, a consultant with A.S. Hansen and an editor with the *Whole Earth Software Catalog*, to explain how a computer could be 99-percent IBM compatible. Could he provide an example of a program that would not run on a well-known compatible, in this case the Compaq Portable. Liswood demonstrated, as it were, a program called *Scientific Plotter*, which he said was one of the few that he found did not work on the Compaq. He noted this was a popular program in the Apple II world and recommended by the *Catalog*. But when trying to open it on the Compaq, the machine jammed just after displaying the title screen.

Kildall asked if a customer had any recourse if they purchased an incompatible program. Liswood said no, and when he ran into this problem with *Scientific Plotter*, the publisher said it only ran on the IBM PC XT and not the Compaq. Indeed, customer service was told to inform anyone who called that the software would not work without the original IBM BIOS.

This brought up the legal question of copying or recreating IBM's BIOS. Cheifet asked Grais, an attorney with Grais & Richards, how anyone could legally make an IBM clone and advertise it as compatible. Grais explained what is commonly known as "clean room design"–although he did not use this exact phrase. Basically, Grais said as long as you could persuade a judge that you didn't simply go to ComputerLand, buy a copy of IBM's BIOS program, and copy it, you were okay. The way to do this was to have one person prepare a specification of what the program is supposed to do, while a second person–who had never seen IBM's original software–wrote the program to meet that specification. As long as this second person did not copy any original IBM code, then the clone maker was probably safe from an IBM legal challenge.

Cheifet noted, however, that there were a couple of lawsuits, notably an IBM case against Eagle Computers, that alleged illegal copying of the PC BIOS. Why did these lawsuits happen? Grais replied that Eagle settled the IBM lawsuit immediately, so the public never learned much about the merits of the case. But you could probably figure that IBM called them on the phone just before filing the lawsuit and Eagle realized it didn't have a strong defense.

Kildall pointed out that Apple recently received a patent for the pull-down menus on the Macintosh user interface. If patents like that were now being approved, could IBM patent something like its new *TopView* operating system? Wouldn't that cause some real problems? Grais said he knew IBM did intend to seek patent protection for *TopView*. But the law regarding the patenting of the software was still "unsettled," so it was difficult to say what the outcome would be. In contrast, the law of copyright was much more clear, particularly following Apple's victory over an Apple II clonemaker, Franklin Computers, in a 1983 federal appeals court decision.

Kildall said that if the industry continued to follow IBM and that Big Blue's response was to protect its user interface using copyright or patents, what would that actually do to the clone manufacturers? Grais said that was difficult to answer without looking at a particular program and the way it was protected. He noted that clonemakers had already found a way to legally emulate the BIOS of the IBM PC. Indeed, the Tandy 1000 had a perfectly legal and 100-percent compatible BIOS, and as far as anyone knew IBM had not raised any complaints. Nor did they about the Compaq Portable. The next challenge, Grais said, would be for the clone companies to find a way to legally emulate the BIOS in the new IBM PC-AT and possibly the *TopView* user interface.

Cheifet noted there were currently about 50 IBM clones currently on the market. Some had died and a couple were successful. What made the difference between a successful clone and a failed clone? Grais said that was a commercial question rather than a legal one. But he reiterated that if your clone had a copied IBM BIOS, then you would fail because IBM will sue you. But if you have a legally emulated BIOS, then it became a question of if you're offering a better computer.

Cheifet asked Liswood about this from a user's perspective. Liswood said that he personally bought the Compaq Portable because of its reputation. It had been around and had a larger user base–and it was portable, even at 38 pounds. He added that other factors like aesthetics and marketing played a role, but it came down to the Compaq's reputation for being the "most compatible of the compatibles." Liswood said he used to take a Pascal-based program called *GraphWriter* to test IBM clones, and the Compaq was the only machine that could run it. So now he kept an IBM PC XT at work and a Compaq Portable at home.

Kildall noted the clone industry could benefit from changes to IBM's video interface, which insulated applications programs from the graphics system.

Previously, an IBM machine required graphics to work in a specific area of memory. Now, Kildall said clonemakers would have the freedom to move towards higher resolution displays.

Liswood then provided a demonstration of a software-based compatibility issue that can arise on a clone. He booted *Sidekick*–shown earlier in Wendy Woods' compatibility test for the PCjr–which loaded a separate file manager for the machine's hard disk. Liswood explained that both programs started out working well together on the Compaq. But they got in the way of other programs that wanted to run. Essentially, the Compaq crashed when attempting to multi-task with *Sidekick* loaded.

Kildall explained this was the tip of the iceberg as PCs moved into more multi-tasking and networking functions. Traditionally, PC programs were designed to run on simple, single-user systems where the program took over the whole computer. Now if you had one program running in a multi-tasking world with another, both programs tried to access the screen at the same time, as was the case when trying to run *Sidekick* with something else on the Compaq. Liswood reiterated this wasn't a hardware issue, as this problem also affected the IBM PC XT. It was a matter of software incompatibility where multiple programs tried to use the same memory at the same time and lousing everything up.

Rooting for the Non-Clone PCs

Paul Schindler ended the main part of the episode with a commentary. He said he didn't like the PC clones. IBM had set the standard not because it had a better product, but simply because it was IBM.

Schindler conceded that the personal computer market was in "turmoil and ferment" before IBM entered it. But that turmoil had an advantage in that there were a lot of people trying to give people more computer for less money. IBM simply waited and watched while many other companies–notably Apple–defined the personal computer market. Then IBM came in and used its traditional relationship with corporate buyers to suggest they *only* buy from IBM.

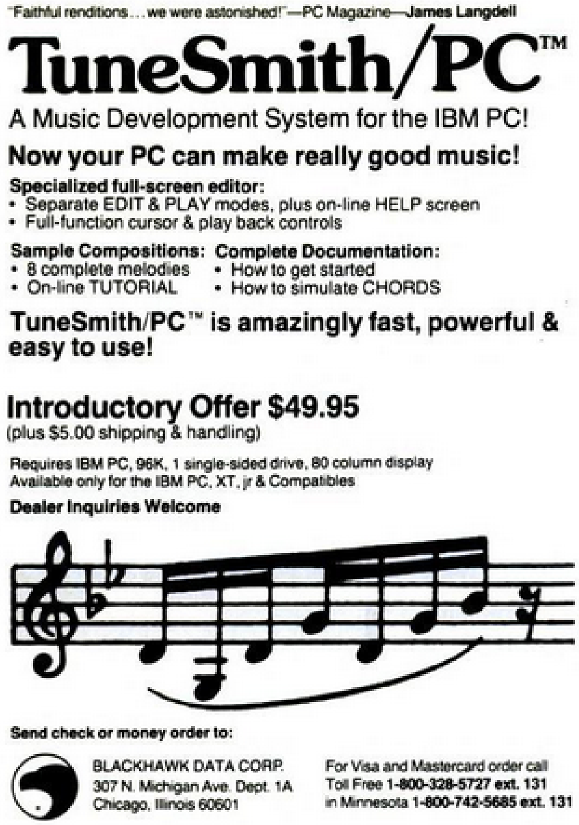
As a result, Schindler said that with the exception of Apple, all of the non-clone makers were dying on the vine. Schindler said he would never buy an IBM or IBM clone himself because he wanted to encourage innovation–and he thought the viewer should do the same. He said we should all root for the non-clone PC makers to be successful.

Apple’s 1985 Sequel to “1984” Ad Not Well Received

Stewart Cheifet presented this week’s “Random Access,” which dates the episode in late January 1985.

- AT&T and Microsoft announced an “extended relationship” intended to establish the former’s UNIX operating system as a new industry standard. Cheifet said that at the recent UniForum conference in Dallas, AT&T said it would ensure its SystemV UNIX would be compatible with Microsoft’s Xenix. Intel, National Semiconductor, and Motorola also agreed to adapt their respective microprocessors to work with SystemV.
- UniForum was the first event held at the new Dallas Informart, a $100 million, 1.5 million square foot building designed to serve as a “permanent computer expo.”
- MicroPro sued American Brands, Inc., alleging copyright infringement of a number of programs, notably the popular word processor *WordStar*.
- The U.S. Department of Commerce issued a report that said the United States accounted for 70 percent of the world’s $18 billion software market. But with “proper copyright and trade policies,” the U.S. share could grow to 75 percent over the next two years, when the market was expected to be worth upwards of $55 billion.
- Paul Schindler offered his weekly software review, this time for *TuneSmith/PC*, which converted simple BASIC programs into playable music. Schindler was impressed with *TuneSmith*, particularly given the IBM

Personal Computer was never meant to make music, as it only had a one-voice beeper speaker.



"Faithful renditions . . . we were astonished!"—PC Magazine—James Langdell

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A Music Development System for the IBM PC!

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- Cheifet noted that bubble memory–a favorite technology of Gary Kildall from last season–may be making a comeback. Researchers at Carnegie-Mellon University in Pennsylvania said they had developed a new form of bubble memory that was 16 times more efficient than prior efforts.
- Cheifet said that police in New Jersey were experimenting with a new computer device that could purportedly perform an "instant brain scan" to help determine if a person was under the influence of drugs. The police said if successful, the device could be used as a possible supplement to traditional Brethalyzer tests in DWI cases.
- Apple announced a new project called Macintosh Office, featuring a $7,000 laser printer and the AppleTalk network, which Apple claimed would provide a low-cost means for linking users of Macintosh and MS-DOS computers.
- Apple made this announcement in a commercial aired during Super Bowl XIX. The "Lemmings" ad was considered a "letdown" after the company's famous 1984 ad that aired during the previous year's Super Bowl. Cheifet quipped the 1985 commercial hit with "about the force of the Miami offense" during its 38-16 loss to the San Francisco 49ers.

- In Fayetteville, North Carolina, the local phone company recorded hundreds of phone calls made in the middle of the night from an unoccupied building. Cheifet said it turned out there were two Coca-Cola vending machines that were programmed to automatically call the local distributor when they were empty. The two machines tried to call at the same time and got busy signals, so they just kept calling back all night long. Cheifet said the distributor took down the system for "debugging."
- A Massachusetts-based software company developed a new program, *Puppy Love*, which depicted a virtual dog who could respond to the user and do tricks. The designers said that eventually users would be able to cross-breed their dogs with other "compu-pups."

Tandy 1000 Revives Radio Shack's Retail Fortunes

It's a well-known story today that the Tandy 1000 managed to succeed where the IBM PCjr failed. David L. Farquhar offered a succinct account of what happened on his blog *The Silicon Underground*:

> Unlike the PCjr, the 1000 came with a reasonable keyboard from day one, and had expansion slots and a second drive bay. If you wanted, you could expand a Tandy 1000 to match the IBM PC feature for feature, and it would cost less than a PC. If you didn't, it was a usable home computer pretty much as-is, too, for around $1,200 including a monitor. A comparable PCjr setup cost about the same, since both units frequently went on sale.
>
> Tandy charged less than IBM for the computer itself, but made quite a bit of it back on peripherals. Tandy's monitors and printers cost about the same as IBM.
>
> The Tandy 1000 wasn't quite an exact clone of the IBM PCjr. Tandy made the decision that if it had to choose between PC or PCjr compatibility in the design, PC compatibility was the safer bet. The result was a computer that ran most PCjr games and most PC productivity software, unmodified. Combined with good marketing, the Tandy 1000 showed what the IBM PCjr could have been.

It also can't be understated how much the Tandy 1000's success meant for the fortunes of its parent company. A couple of months before the 1000's November 1984 launch, the *New York Times* reported that Tandy's computer business was "in the basement":

> The company last week announced its first quarterly earnings decline in six years. Its leadership in personal computer sales has been lost to the likes of International Business Machines and Apple Computer, whose strong marketing efforts and price cutting have attracted millions of new personal computer buyers - particularly business users - in recent years.
>
> Most analysts say that Tandy went wrong by failing until last year to realize that it could no longer effectively sell computers in Radio Shack stores, which flourished as computer outlets in the days when the desk-top machines appealed mostly to hobbyists and buffs.

Two years later, in July 1986, the *Times* and the analysts changed their tune when it turned out that, uh, people still wanted to buy cheap computers at Radio Shack:

> Analysts said that in introducing the inexpensive computers, Tandy was solidifying its position in the so-called clone market, in which a large number of domestic and foreign companies are making computer products similar to the International Business Machines Corporations' and selling them at lower prices with more features. The analysts added that the new Tandy computers would put pressure on I.B.M. to lower its prices only weeks after the giant computer company slashed its wholesale prices as much as 18 percent.
>
> "The approach of offering the consumer a real value is smart," said Michelle Preston, a computer analyst for L. F. Rothschild, Unterberg, Towbin. "Tandy will be able to compete very effectively with the clone products," she said.

Tandy would continue selling revisions to the original Tandy 1000 up until 1993.

Ed Juge (1936 - 2003)

Ed Juge passed away in March 2003 due to cancer. Juge worked in electronic retailing for more than a decade before joining Tandy/Radio Shack in 1978. He spent six years as the company's director of computer merchandising before taking over as Tandy's primary corporate spokesperson in 1984, a post he held until 1993. In the mid-1990s, he shifted away from corporate work to focus on media consulting for the computer industry as well as his two main hobbies, recreational vehicles and amateur radio.

David Bunnell (1947 - 2016)

David Bunnell was one of the early pioneers of computer media, founding or co-founding a number of publications, including *Personal Computing*, *PC Magazine*, *PC World*, and *Macworld*, the latter two of which continue to this day. Harry McCracken, a former *PC World* writer himself, wrote in an obituary for *Fast Company* following Bunnell's death in 2016 that *PC World* and *Macworld* both represented a significant leap forward in tying tech media brands to specific computing platforms:

> [*PC Magazine*] was such a success that multiple large publishing companies were soon interested in acquiring it. In fact, Bunnell and [co-founder Cheryl] Woodard thought they'd struck a deal to sell it to Pat McGovern of IDG, publisher of *Computerworld* and *InfoWorld*, when they learned that their financial backer had sold it to Ziff-Davis without bothering to tell them. They–and 48 of the magazine's 52 staffers–responded by promptly quitting to found *PC World* for IDG. Its first issue was so thick with advertising that it set records.
>
> With their next major IDG launch, *Macworld*, Bunnell and Woodard perfected the art of hitching a media brand to a computing platform. Thanks to a deal Bunnell hammered out with Steve Jobs, the magazine debuted on January 24, 1984, the same day as the Mac itself, and was promoted directly to new Mac owners via materials that shipped with the computer.
>
> In 1985, *Macworld* the magazine spawned Macworld Expo, one of the few successful tech conferences ever aimed at consumers rather than industry types. By the time I started going circa 1988, it was held on both coasts and the Boston edition, which I attended, filled two convention centers.

Bunnell remained at IDG until 1988. He went on to start a number of additional ventures outside the world of tech media, including the Andrew Fluegelman Foundation, a charity named for a former *Macworld* editor that provided free computers to "poor, mostly inner city high school students." This was part of Bunnell's long history of social activism. For example, Victor F. Zonana noted in a 1987 profile for the *Los Angeles Times* that Bunnell never hesitated to use his position to advocate for minority groups that faced legal oppression:

> Bunnell authored a sharply worded editorial in *PC World* and *Macworld* calling for the repeal of Georgia's "archaic" and "oppressive" law against sodomy. The editorial was prompted by a letter from Georgia's governor extolling the state as a center for high technology.

“The PC promise is to preserve and enhance the power of the individual,” the editorial thunders. The Georgia law “stifles the very progressiveness Gov. Joe Frank Harris hopes to promote” and “conflicts with the vision of personal freedom that compelled the growth of personal computers.”

The reaction was swift. About 5,000 letters poured in–more than the magazines had received in their entire history–and most of them were negative. A hundred subscribers canceled. And a handful of advertisers pulled a total of $20,000 of ads.

Notes from the Random Access File

- This episode is available at the Internet Archive and was first broadcast on January 24, 1985.
- The Compaq Portable, the other clone machine featured prominently in this episode, was already something of a legacy product, having been released in March 1983. The Portable was the first computer produced by Compaq and while it is often described as the first “100 percent” IBM compatible, former Compaq employee Paul Dixon has said that nobody within the company, or at least in the engineering department, ever made such a claim and that the actual degree of compatibility was “a moving target.”
- Given the legal discussion over BIOS and copyrights during the segment with David Grais, it’s worth pointing out that Stewart Cheifet was once a practicing attorney. He graduated from Harvard Law School and worked as a lawyer for the news divisions of ABC and CBS in the 1960s before moving into journalism.
- Software patents remain a controversial and unsettled area of the law even to this day.
- David Grais still practices law at Grais & Ellsworth, a New York City firm that represents plaintiffs in securities and financial litigation.
- I don’t have much to report on what became of Woody Liswood. The company he worked for at the time of his *Chronicles* appearance, A.S. Hansen, was a human resources consulting firm. Hansen merged into another firm in 1986. Beyond that, there are some scattered writings on computer topics by Liswood dating from the late 1990s, along with references to him teaching at colleges in California and Colorado.
- Shugart Associates was, of course, the first disk drive company founded by Alan Shugart, who later formed Seagate Technology and previously appeared on *Computer Chronicles* to discuss the future of his beloved 5.25-inch floppy.

- Before starting his various magazines, David Bunnell worked for Adam Osborne, a prior *Computer Chronicles* guest. In fact, Osborne appeared in his episode with Lore Harp, who married Bunnell’s boss at IDG, Pat McGovern.

Chapter 4: Locksmith, PC-Talk, and Frankie Mouse

In the last episode, Wendy Woods mentioned that during her testing of IBM PC software compatibility with the PCjr that only the version of Borland's *Sidekick* without copy protection worked with the latter machine. The version with copy protection was incompatible with the PCjr.

You might wonder, then, why anyone would have purchased the copy protected version in the first place. The answer was likely price. According to Borland's advertising from the time–early 1985–the protected version cost $55, while the non-protected version ran $85.

Copy protection, of course, referred to a number of different methods used during the era of disk-based software distribution to prevent users from making additional copies–and possibly giving away or selling those copies to other potential customers. The industry took to referring to the practice of unauthorized copying as "software piracy," which was the subject of this next *Computer Chronicles* episode.

"Why Did Software Cost So Much?"

For the cold open, Stewart Cheifet stood in front of a literal pirate–well, a wax figure of one displayed a Madame Tussands in San Francisco. He quipped that in the old days, a pirate looked like this figure and stole treasury, jewelry, gold, and silver. But today a pirate didn't need an eye patch, a sword, or even a wooden leg. All you needed was a floppy disk and a little ingenuity.

In the studio, Cheifet asked Gary Kildall–himself the CEO of a major software company, Digital Research–just how serious was the problem of software piracy. Kildall replied it was very serious. The problem was that as a software producer, you couldn't tell how much you were going to sell versus how much was going to be stolen. As a result, prices went up to make up for that difference. But if we could control piracy, he said, then we would know how much to sell and the industry would stabilize at a lower price level–much like the record industry.

Wendy Woods then presented her first remote segment, narrating over some B-roll footage of an unidentified software company (I think it was MicroPro, the company behind *WordStar*). Woods said that behind the discussion of the rights and wrongs of software piracy, there was a recurring question: Why did software cost so much? Except for the box it came in, commercial software looked like any other floppy disk. But for the publisher, the production cost of that disk was easily measured.

The biggest expense, Woods noted, was program development. A top word processing program could take 18 months of development time and require a team of 60 people. This team has to perform a number of tasks, including developing source code, user screens, help systems, and manuals. Indeed, prestigious software houses stressed their documentation and on-screen tutorials as part of their extensive customer product training.

Woods said the impetus for a product's design came from a large marketing department. Advertising, package design, and merchandising all added another layer of cost. And when you factored in disk reproduction, typesetting, printing, and distribution, the overall cost of getting the program to the consumer rose to several million dollars.

Woods noted that to an advanced user who buys software based on word of mouth or by trying out a friend's copy, the elaborate ad campaigns and customer coddling might seem like overkill. On the other hand, a first-time computer user may demand it. In any case, she concluded, the expenses were considerable and genuine–but for the user, that didn't make the prices of software any easier to pay.

Activision Executive Lectures Other People About Having "Ethical Blinders"

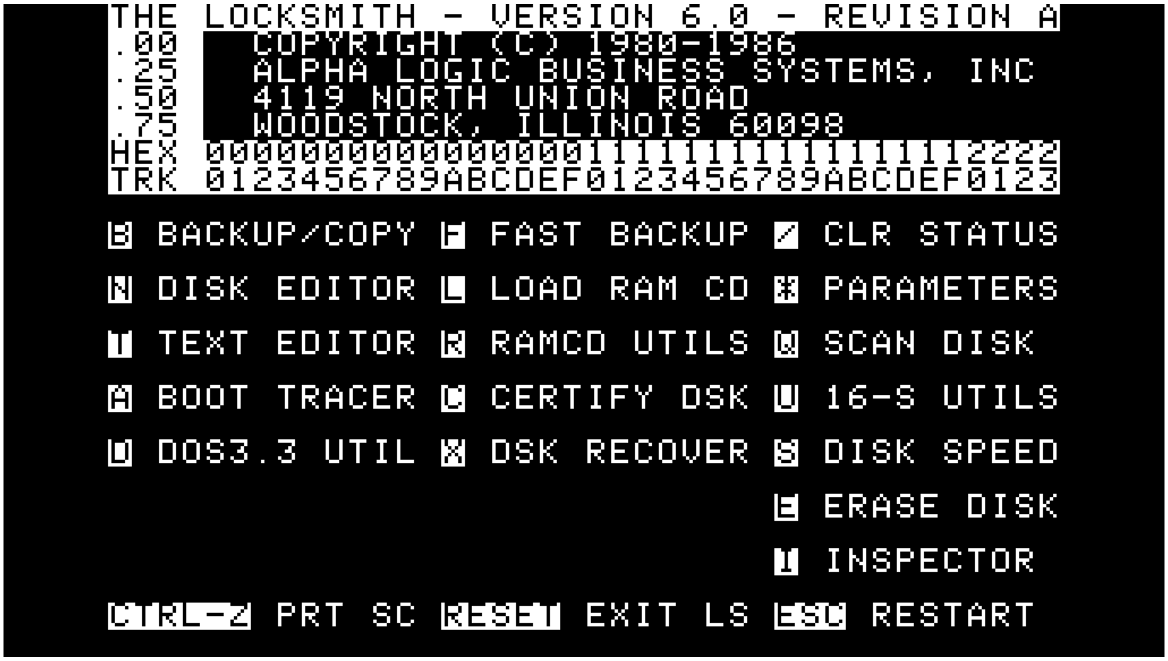
Back in the studio, Mark Pump and R.L. Smith McKeithen joined Cheifet and Kildall. McKeithen was an attorney and the general counsel for software developer Activision. Kildall noted that Activision had traditionally been in the business of producing ROM cartridges for video game consoles (such as the Atari 2600), but the company had now moved into disk-based computer software. Kildall asked McKeithen how he–and Activision–viewed disk piracy. McKeithen replied it was a matter of Activision's intellectual property being ripped off by people who hadn't put the intellectual or financial investment into its creation.

McKeithen claimed it took between 1,500 and 2,000 hours to create a piece of quality software and that was an investment just like the one that an author made in writing a book or a director put into making a movie. So when someone took that product and tried to market it for pennies on the dollar, it meant the creator of an Activision game–such as *Ghostbusters*' David Crane–was working for nothing.

Kildall asked if there was any difference between someone who copied and resold software versus someone who simply gave a copy to a friend. McKeithen said he made no distinction. Both types of people suffered from "ethical blinders" in his view. McKeithen said it was as if he took a Porsche that he never wanted to drive but slipped past a security guard. Even if he didn't drive the care, or he gave it to a friend, that would still be stealing. And the same thing was true for a company like Activision when someone used its software in an unauthorized manner.

Cheifet then turned to Pump, whose company sold a disk copying program called *Locksmith*, and asked if users sometimes had a legitimate need to make copies of a program. Pump said without a doubt, they did. If they used an original copy that became unusable, then they were left without a program that their business might depend on for its daily operations. Kildall added that there was also a basic need that some people had to copy a program from a floppy disk to a hard drive.

Pump then provided a demonstration of *Locksmith* using an Apple II with two attached disk drives. He explained it was a program that made an identical copy of the original disk. It did not "break" any copy protection on the original disk as it made a bit-for-bit copy, thereby retaining any copy protection, copyright notices, and serial numbers.



```
THE LOCKSMITH - VERSION 6.0 - REVISION A
.00     COPYRIGHT (C) 1980-1986
.25     ALPHA LOGIC BUSINESS SYSTEMS, INC
.50     4119 NORTH UNION ROAD
.75     WOODSTOCK, ILLINOIS 60098
HEX 00000000000000001111111111111111 2222
TRK 0123456789ABCDEF0123456789ABCDEF0123

B BACKUP/COPY F FAST BACKUP / CLR STATUS

N DISK EDITOR L LOAD RAM CD * PARAMETERS

T TEXT EDITOR R RAMCD UTILS Q SCAN DISK

A BOOT TRACER C CERTIFY DSK U 16-S UTILS

D DOS3.3 UTIL X DSK RECOVER S DISK SPEED

                            E ERASE DISK

                            I INSPECTOR

CTRL-Z PRT SC RESET EXIT LS ESC RESTART
```

Title screen from “Locksmith” for the Apple II

Pump noted that *Locksmith* was not a very fast utility. It took between 8 and 10 minutes to make a backup copy. This did not lend itself easily to commercial pirates who needed to make copies much faster. Still, Kildall pointed out that an 8-minute backup was a lot cheaper for users than paying $40 for an extra original disk. Pump said the idea was that a user would make a backup, store the original away, and then use the backup. That way, when the backup became unusable, you would have the original to make another backup.

Kildall clarified that *Locksmith* then was not intended for use as a piracy tool. Pump said in the product’s manual and advertising, it was made clear that users were only to use *Locksmith* for legal purposes. Of course, there were people who used it for piracy, even though there were much better ways to pirate software than *Locksmith*.

Cheifet asked McKeithen for his reaction. McKeithen said the problem with a product like *Locksmith* was that it facilitated people getting into stealing. It made it much too simple. If, in fact, a user of Activision’s products had a problem with their original disk, they could call a toll-free line or send the damaged product in for a replacement. Activision offered a 1-year warranty. He added the company received over 3,000 pieces of mail per week from users who wanted to know about upcoming products. These users had formed a bond with Activision, which the company would not ignore by not giving them good service. And all of the responsible software manufacturers followed that same trend. So McKeithen saw no need for a product like *Locksmith* in the event of someone having a damaged product they wanted to use.

Kildall pushed back a little, noting software providers weren't allowing for the possibility of legitimate backups. He noted he ran into this problem himself, as there were programs he could not get onto his hard disk. McKeithen asked if Kildall had talked to the manufacturers about such problems. Kildall said sure he did, but they replied they didn't want to give up control over distribution due to fears of illegitimate copying. McKeithen acknowledged there was a tension in the system, but the problem with a product like *Locksmith* and the wider-than-Activision-would-like use of illegitimate copies was that in the long range it would spoil the production of creative intellectual property for everyone. And that, he said, was a zero-sum game.

Cheifet asked Pump if he had any feedback about how customers used *Locksmith*. Pump reiterated that even without programs like *Locksmith*, software piracy would still exist. Sophisticated "hackers" didn't need such programs. They had the technical expertise to break or remove copy protection from software without actually copying the original disk. Kildall noted that may be true for some pirates, but he said that even his 15-year-old son and his friends were now copying software. And he didn't think that would be possible without programs that helped them unlock protected disks. Pump added that one of the largest users of *Locksmith* was schools. Educational software was not cheap, and teachers were reluctant to take their only copy of an expensive program and put it into their student's hands, allowing it to either be stolen or damaged. So most schools that purchased *Locksmith* used it to archive and make backup copies of the original disks.

Software Industry Strikes Blow Against Teen Pirates

The third segment began with two new guests, John Draper and Neil A. Smith, who joined Cheifet and Kildall on the set. Cheifet noted Draper was once known as a pirate who went by the name "Cap'n Crunch" when that term referred to stealing long-distance phone calls rather than software. Today, Kildall said Draper was now a software vendor as the author of the IBM PC word processor *EasyWriter* and other programs. So how did Draper feel about modern software piracy? Draper said it was definitely a problem. He reiterated the point made throughout the episode that software was very expensive because programmers couldn't work for nothing. He noted one alternative was "freeware," which eliminated many of the problems associated with copy protection.

Kildall pointed out that freeware had the problem of support. Draper agreed, noting that you would only provide support for those users who actually mailed in their $20 or $30 checks to pay for a license.

Cheifet then asked Smith, an attorney who represented the recently formed Software Publishers Association (SPA), if he agreed that the cost of software was a problem. Smith said it was something of a chicken-and-egg problem. If you looked at the marketing of software, you found that one reason it had to be sold at high prices was to recoup development costs. If the manufacturer could count on everybody who used the program to buy a copy, that cost would drop dramatically. In many cases, however, he thought people were fooling themselves into blaming high prices for piracy. If that cost could be spread out, prices would be more like music records that cost $10 each.

Cheifet noted that Smith and the SPA had recently shut down a commercial software piracy group called the West Coast Computer Connection. Smith said this was one of the more “brazen” operations he’d come across. This group actually distributed a multi-page catalog listing hundreds of pirated programs for sale. He noted that one of those programs was actually *Locksmith*, which itself was copy protected and thus subject to piracy.

Cheifet asked about the ultimate fate of this piracy group. Smith said it turned out to be some “juveniles” and he visited with them and explained the seriousness of what they were doing. The SPA ultimately obtained a written agreement from the juveniles to “cut it out.” Smith noted there were much stronger remedies available under the law.

“Freeware” as an Alternative to Anti-Piracy Measures

Following up on John Draper’s earlier mention of “freeware” as an alternative method of distributing software, Wendy Woods presented her second remote, featuring Andrew Flugelman’s home-based software company, Headland Press, which produced a non-protected communications program called *PC-Talk*. Woods noted that not only was there no copy protection on *PC-Talk*, the user could freely make and distribute copies.

Flugelman told Woods that what he had done was simply address the whole notion of copy protection and piracy in a different way. Rather than restricting access to the program and appealing to people’s dishonesty, he was giving wider access to the program and appealing to the user’s honesty. Woods said about 1 out of every 10 users who copied *PC-Talk* not only paid the suggested registration fee of $35; they also sent letters of appreciation to Flugelman.

But what did this freeware model mean in terms of support, which was usually the biggest part of a software company's budget? What did Flugelman do if people hadn't paid for the program? He told Woods that they did better business by giving out the information, and if someone was using *PC-Talk* and hadn't paid, by helping them to use the program they were more likely to pay. Woods said that Flugelman thought the rest of the industry could take a lesson from his approach. He received important feedback, business, and appreciation because of his philosophy. And while Flugelman wasn't getting rich, he did receive a surprising amount of gratitude.

"Basically, It's Just for Fun and Recognition."

Back in the studio, Cheifet, Kildall, and Smith were joined by a teenage software "pirate" identified only by the handle "Frankie Mouse." Kildall offered a disclaimer that by allowing Mouse to demonstrate software piracy techniques, they were not condoning it all. But he said this was a rare opportunity to see what pirating was all about.

Mouse logged into an online bulletin board used by hackers that displayed a list of text files that provided information on how to commit software piracy, such as "Basics of Cracking 101." He said that if you didn't already know how to pirate software, these files would teach you. Mouse clarified that he did not write these how-to files. Someone else wrote them and they were now available throughout the country on different boards.

Kildall asked how many people were involved in these kinds of bulletin boards. Mouse said it depended on the board. Some had as few as 100 members, while others might have between 2,000 and 3,000 users.

Cheifet asked if it was possible to use the board Mouse had logged onto to actually get a piece of pirated software. Mouse explained that there were separate online repositories known as AE Lines used to actually download pirated software. These were not bulletin boards. Rather, they allowed the pirate to call a computer and download programs where the copy protection had been cracked.

Kildall asked Mouse why he downloaded pirated software. Mouse said that unlike the West Coast Computer Connection, he and his friends never engaged in piracy for profit. He said, “Basically, it’s just for fun and recognition.” If you mentioned a popular handle such as “Mr. Crackman” to any pirate, they would know who he was–not personally, but they knew his work. Kildall suggested that it was basically pirating for the fun of cracking a program. Mouse said yes, it was like a game. You felt like you were outsmarting the software makers.

Kildall asked Mouse if there were any moral issues he worried about with respect to piracy. Mouse said you could not deny that this was stealing. You didn’t pay for the software and now you had it. At the same time, he really couldn’t say how much the software companies lost in revenue, because a copied program was like free advertising. He noted that among his group, they had a “code of honor,” meaning that if they used a program a lot and liked it, they would go out and purchase a legal copy to obtain the manuals and support.

Cheifet asked Smith for his response to Mouse’s statements given that he represented the software publishers. Smith said this was both a moral and a legal issue. He reiterated that when people used software without paying for it, that meant software was a lot more expensive. He said that was an economic issue–if everyone just paid a small amount, we probably would see dramatic price drops. In terms of the legal issue, Smith said he was happy Mouse admitted his actions were stealing. Smith explained that copyright infringement is a crime under U.S. law punishable by up to 1 year in prison. Additionally, the copying of software company’s trademarks is a separate criminal offense punishable by up to 5 years in prison.

Mouse then demonstrated a pirated copy of *DB Master*, a popular database program for the Apple II. He noted this particular software was “protected like crazy.” But his pirate group managed to remove the protection so that it could be copied from a BASIC prompt. Indeed, Mouse said he was surprised to learn that *DB Master* itself was largely written in BASIC, given that most commercial software was written in assembly language.

Kildall asked Mouse what it would take him to buy a program rather than steal it. Was there some incentive the manufacturer could provide? Mouse repeated his earlier statement that if there was a program he used a lot, he would buy it for the manuals and support. So he said the answer was for companies to simply put out good manuals and support their products.

Cheaper Software Is the Solution

Paul Schindler wrapped up the episode with his traditional commentary. He said the question of whether software piracy was moral was hard to answer. Obviously, piracy was illegal and the definition was simple: It’s piracy if you gave away a commercial software program. Yet most people thought piracy was only immoral if you sold the software. Those two views were irreconcilable, Schindler said, and caused a great deal of controversy within the software industry.

As a result, developers were constantly looking for ways to stop piracy. One of the most common–and dumbest, in Schindler’s opinion–was copy protection. It caused a lot of problems for users. Even worse, copy proofing addressed the symptoms and not the cause of piracy. And as far as Schindler was concerned, high prices caused piracy. He understood that *Lotus 1-2-3* cost $700 because the developers wanted to make their money back. Corporations could afford prices like that, but private individuals could not. So whether or not software piracy was moral, expensive software was pirated a lot more frequently than cheap software. Schindler said the ultimate solution to piracy was thus for developers to find a way to make cheaper software.

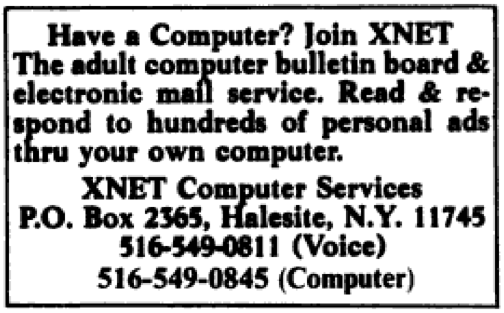
The First Online Dating Service?

Stewart Cheifet presented this week’s “Random Access,” which dates the episode in late January 1985.

- The Internal Revenue Service was looking into electronic filing, including the possibility of letting individuals send in their tax returns on a floppy disk. One IRS analyst said electronic filing could happen within the next 5 years.
- Meanwhile, software stores were filling up with tax preparation programs. Cheifet said there were at least 50 such programs now on the market, ranging in price from $50 to $300. Some programs simply helped you fill out returns while others offered more advanced tax planning. The five most well-known tax programs for the IBM PC and Apple II computers were:
    - Tax Preparer (Howardsoft, $295)
    - Softax (Design Trends Ltd., $199)
    - PC TaxCut (Best Programs, $199)
    - Tax Advantage (Continental Software, $69.95)
    - Tax Wizard (Gamma Productions, $64.95)
- The IRS also said it would crack down on the use of tax deductions for home computers. Under revised regulations, a person could only take the full deduction for their PC if they used it at least 50 percent of the time for

legitimate business purposes. Cheifet added that using a computer to analyze your personal investments would not count towards that 50 percent.

- *Businessweek* reported that employers were now warming to the idea of using online databases to search for prospective employees. There were at least 5 such online job databases now in operation.
- Cheifet said American manufacturers were "poised for the impending invasion" of Japanese personal computers using the MSX architecture but nobody seemed that worried. Industry analysts seemed to think the Japanese machines would offer "too little, too late," noting that they had already received a "cool reception" after being introduced in Europe in 1984.
- Paul Schindler returned for his weekly software review, this time of the game *Night Mission Pinball*, which he described as the "finest physical simulation of a game" that he had ever seen.
- Cheifet said that Commodore Business Machines planned to layoff 500 workers from its manufacturing plants in Pennsylvania and California following slow Christmas 1984 sales.
- Hewlett-Packard planned to release an upgrade to its 110 Portable computer. Cheifet said the new model would have a 24-line display, 512 KB of RAM, and cost under $2,000, although it would not include any bundled software. (This machine would be known as the HP 110 Plus.)
- According to a survey by Software Access International, the average computer owner spent about 12.2 hours per week on their PC, dividing that time equally between work and gaming.
- COMEX, the New York Commodity Exchange, was now selling a computer simulation of commodities trading, which it hoped would encourage people to enter the field.
- Finally, *New York* magazine announced a new electronic mail service, *XNET*, that provided an online bulletin board for personal ads. Cheifet said about 300 people had already signed up for the service. (The service cost $25 for the initial subscription plus $5 per month to rent the election mailbox.)



Have a Computer? Join XNET
The adult computer bulletin board & electronic mail service. Read & respond to hundreds of personal ads thru your own computer.

XNET Computer Services
P.O. Box 2365, Halesite, N.Y. 11745
516-549-0811 (Voice)
516-549-0845 (Computer)

> Advertisement from “New York” Magazine, c. 1985: “Have a Computer? Join XNET. The adult computer bulletin board & electronic mail service. Read & respond to hundreds of personal ads thru your own computer.”

Andrew Flugelman (1943 - c.1985)

In the last post, I mentioned that the late David Bunnell started a foundation in honor of Andrew Flugelman, who turned out to be a featured subject in this episode. Flugelman was the founding editor at both *PC World* and *Macworld*, where Bunnell was the publisher. He also became widely known as the father of “shareware,” which he referred to as “freeware.” Benj Edwards clarified the confusion over the nomenclature in a recent article for *How-To Geek*:

> In 1982, Andrew Fluegelman created a telecommunications program called *PC-Talk* on his new IBM PC and began sharing it with his friends. Before long, he realized that he could put a special message inside the software asking for a $25 donation in return for future updates to the program. (Fluegelman called his concept “freeware,” but he reportedly later trademarked the term, leading to its limited use in the industry. The term was redefined after his death in 1985.)

Indeed, about six months after this *Chronicles* episode aired, Flugelman disappeared. He was never seen again and is presumed dead. According to a September 1985 report in *PC Magazine*,

> Flugelman had been reported missing on July 8. His 1982 Mazda was found on July 11, abandoned near the north end of the Golden Gate Bridge. Tiburon police, still treating his disappearance as a missing-persons case, found a note in Flugelman’s car but say its contents were “inconclusive.”
>
> A memorial service was held in White Plains, N.Y., by Flugelman’s relatives on July 14. In San Francisco, a service for Flugelman was held on July 19.

In the years following Flugelman’s presumed death, the distribution of software as freeware/shareware became more commonplace. As Benj Edwards noted, the same bulletin board systems used by software pirates also “represented an alternative distribution channel” for legal shareware. This eliminated a lot of the overhead costs associated with traditional software development and marketing. Of course, the rise of the commercial Internet and open-source software models during the 1990s largely relegated shareware to restricted “demos” of software as opposed to fully fledged programs.

Is Backing Up Software Legal?

Since my day job is writing blog posts for law firms, I would like to clarify one issue that came up in the episode. Smith McKeithen never actually came out and said that it was illegal for users to make backup or archival copies of their legally purchased software. That’s because he knew such behavior was perfectly legal. In 1980, Congress amended the Copyright Act to state that a person who purchased a legal copy of a software program did not infringe the author’s copyright by making an additional copy either as “an essential step in the utilization of the computer program in conjunction with a machine” or if the additional copy was “for archival purposes only.”

In other words, copying purchased software from a floppy disk to a hard drive was not against the law, either in 1985 or today. Companies like Activision may have actively fought against the practice initially, but by the end of the 1980s hard drives were in wide enough use that this largely ceased to be an issue.

It’s also worth noting that not all software companies offered replacement disks as a form of customer support. Donald W. Larson, who worked for Omega MicroWare, the publisher of *Locksmith*, addressed this point in a 2000 online forum post:

> *Visicalc* was the number one program that users bought *Locksmith* to copy. In those years gone by, many software publishers would not provide a backup or replacement copy of software if the disk became unreadable. Because the Copyright law allowed a user to create a backup copy of software for their own use, Omega MicroWare had a fantastic market niche.
>
> However, we followed a policy and would not publish *Locksmith* program parameters for publishers that provided a free backup disk or replacement policy for registered users. Many CEOs called me to complain about *Locksmith* parameters until I told them about that policy. Some changed their tunes afterwards and some continued to complain.

I wonder if Larson ever took a call from McKeithen.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an initial broadcast date of January 31, 1985.
- R.L. Smith McKeithen practiced law for more than 30 years before retiring in 2015. After leaving Activision in the late 1980s, he served as general counsel for a number of other companies, including Silicon Graphics, Inc.
- McKeithen was also a staff attorney for the House Judiciary Committee's 1974 impeachment inquiry into President Richard Nixon, where his colleagues included future Secretary of State Hillary Rodham Clinton and future Massachusetts Governor Bill Weld.
- The other featured attorney in this episode, Neil A. Smith, is still active in the profession. He was a partner at Limbach, Limbach & Sutton for 25 years. In 2012, he was appointed to a one-year term as an administrative patent judge with the Patent Trial and Appeal Board of the U.S. Patent and Trademark Office. Since 2018, Smith has been "of counsel" with the San Francisco firm of KB Ash Law.
- Actually, the late Andrew Flugelman was also a licensed attorney in California. Together with Stewart Cheifet, that makes four lawyers in this episode, which has to be some sort of record.
- Unfortunately, I could not track down any reliable information on the whereabouts of Mark Pump. His Illinois-based software company, Alpha Logic Business Systems, dissolved in 1989.
- As you might expect, I also have nothing to report on "Frankie Mouse." The pseudonym may have been a reference to a character from Douglas Adams' *The Hitchhiker's Guide to the Galaxy*.
- In a 2011 post, tech writer Robert X. Cringely claimed that Apple co-founder Steve Wozniak was the actual creator of *Locksmith*. Cringely said Woz wrote the program to defeat the built-in copy protection that he himself had designed into the Apple II disk drive. I can't find any independent collaboration of this story, and David M. Alpert, the publisher of *Locksmith*, told *PC World* in 1985 that Mark Pump was, in fact, the program's author.
- That said, if Woz was involved with *Locksmith*, it would not be out of character, given that he and Steve Jobs were both inspired by John Draper's telephone piracy–also known as *phreaking*–in the early days of their friendship, a story recounted by Phil Lapsley for *The Atlantic* in 2013.
- As for Draper, I don't have much to say about him here. You can read about his fate in this 2017 *Buzzfeed* report.
- Having attended an underfunded elementary school in the late 1980s, I can confirm that students were almost always given legally dubious copies of software to use in the Apple II computer lab.

- The Software Publishers Association–today called the Software and Information Industry Association–started in 1984 as an anti-piracy industry group. It will also be a presenting sponsor of *Computer Chronicles* in future seasons.
- Since I haven’t mentioned it yet, this season’s presenting sponsor is McGraw-Hill, the publisher of *Popular Computing* magazine.

Chapter 5: The Data General-One, TI Pro-Lite, HP 110 Portable, and Morrow Pivot

Although Paul Schindler's commentary comes at the end of the episode just before "Random Access," I thought I'd discuss his thoughts upfront this time as it helps provide some useful context for this early January 1985 episode, which is about portable computers. Schindler compared a portable computer to a portable sewing machine. With respect to the latter, he said it made more sense for most people just to carry a needle with them. Sure, you wouldn't be able to do any fancy sewing with a needle, but you could do smaller jobs quickly.

Schindler thought the same was true of portable computers. He eschewed the more fully functional models we'll see during the main part of the episode in favor of a smaller pocket computer. (A Twitter correspondent suggested the machine Schindler exhibited was a TRS-80 Model 100, which makes sense.) It wouldn't run CP/M programs, Schindler said, but it didn't need to. What mattered was that his pocket computer was light, ran on batteries, had a full-size keyboard, and displayed 240 characters on the screen.

More to the point, Schindler said these pocket computers were mostly used by journalists such as himself, and that market was already well served. He therefore didn't think there was much future for "briefcase computers" like his, but there would be for the larger, sewing machine-type models.

Were Portable PCs Just Another Piece of Luggage?

Indeed, we would see four different "portable computers" on display during this episode. Stewart Cheifet and Gary Kildall actually opened the show by briefly discussing a portable that was even smaller than Paul Schindler's pocket computer–the Seiko UC-2000, a wristwatch wearable computer that could plug into a separate dock.

Cheifet remarked he wasn't actually sure you could do anything useful with the Seiko device. And that was his overarching question with respect to portable computers: Was this another case of technology in search of a purpose? Kildall didn't think so. He said portables were just a new dimension of technology. In the past few years, we'd seen faster processors and more memory in computers. Now what we're looking for was to get all that speed and power into a smaller package.

This led into Wendy Woods' first remote segment, which featured some fine B-roll of a businessman–Mike Lynch–traveling through an airport and onto an airplane with his "battery-powered laptop computer." Woods noted the secret to the success of these "traveling micros" was their ability to record and provide information on the spot and transmit data electronically.

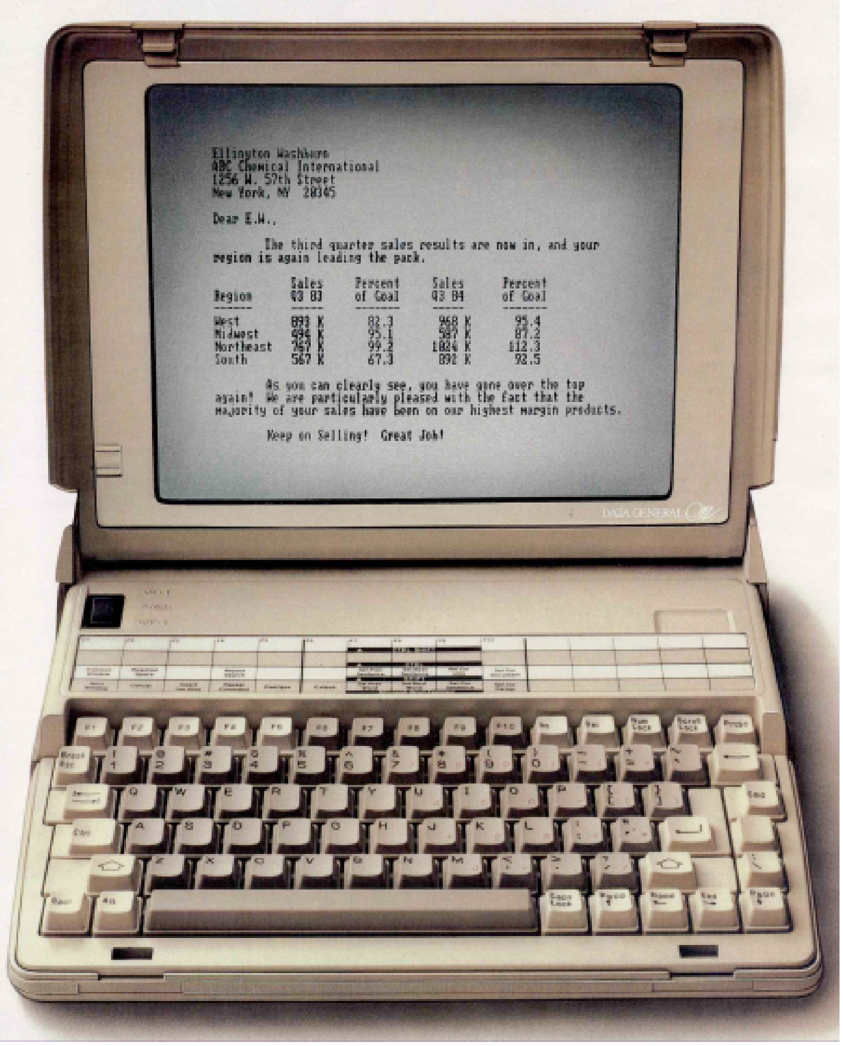
Echoing Paul Schindler's later commentary, Woods noted that up until now the buyers of portables had mostly been journalists and other people who spent most of their jobs on the road. For example, Lynch put his computer to work collecting up-to-date travel information from around the world and phoning it in regularly to his home computer back in California. Travel agents and airline personnel could then retrieve this information–including weather, currency exchange rates, and special event schedules–by calling Lynch's home machine.

Woods said that while most portable computers today were far less powerful than the typical home or office machine, they were quickly catching up in terms of both memory capacity and software variety. Portables now came equipped with disk drives and larger screens, and a few could even match the performance of a desk-bound microcomputer. Still, Woods said the future of the traveling portable was not all that clear, as what was considered revolutionary for some might just be "another piece of luggage" for others.

Battle of the Monochrome LCDs

The first studio round table featured Rowland Archer, a manager with Data General, and Faris Gaffney, a product marketing executive with Texas Instruments. The two men were there to demonstrate their companies' respective portable offerings, the Data General-One and the Texas Instruments Pro-Lite.

Kildall opened by pointing out that what made portables exciting was that a machine this capable 20 years ago would have filled an entire room. Archer said one of the things that made that possible was the use of liquid-crystal displays (LCDs). Archer exhibited the LCD used in the Data General-One, separate from the machine, so he could show off the special video controllers. Kildall asked if this was the same size as a standard cathode-ray tube (CRT) display. Archer said yes, the LCD had a resolution of 80x25 characters or 640x256 pixels for graphics.



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Ellington Washburn
ABC Chemical International
1256 W. 57th Street
New York, NY  20345

Dear E.W.,

        The third quarter sales results are now in, and your
region is again leading the pack.

             Sales      Percent      Sales       Percent
Region       Q3 83      of Goal      Q3 84       of Goal
------       -----      -------      -----       -------
West         893 K        82.3        968 K        95.4
Midwest      494 K        95.1        587 K        87.2
Northeast    767 K        99.2       1024 K       112.3
South        567 K        67.3        892 K        92.5

        As you can clearly see, you have gone over the top
again!  We are particularly pleased with the fact that the
majority of your sales have been on our highest margin products.

        Keep on Selling!  Great Job!
```

The Data General-One portable computer, featuring a black-and-white LCD displaying a sample file from a spreadsheet program.

Cheifet noted this represented a major advancement. What technology did it actually take to come up with a full-size screen? Archer said Data General approached several Japanese vendors through its Nippon subsidiary. These vendors had just finished producing 16-line LCDs, so Archer said they were not initially interested in starting on 24- or 25-line displays. But Data General was able to convince them of the importance of such displays for the Japanese market. Kildall noted the Japanese were really the pioneers in developing complementary metal-oxide semiconductor (CMOS) parts, which Archer said made battery-powered portables easier to produce, as they required less power and could be surface mounted on a circuit board.

Kildall asked about the memory capacity of the Data General-One. Archer said the model he brought with him had a base capacity of 128 KB.

Returning to the Data General-One’s display, Cheifet asked about the use of “sub-screens” within the LCD. Archer said that was part of how they solved the problem of creating a full-size display. The screen was divided conceptually into two components run by the display controller. This created a “smooth effect” when scrolling from one end of the screen to the other.

Kildall turned to Gaffney and said that one thing that was notable on all of these portables was that the display was in black-and-white. But a lot of popular applications now required color displays. Did Gaffney see color portables as a possibility anytime soon? Gaffney took this opportunity to show off the TI Pro-Lite, which Texas Instruments introduced in November 1984. Like the Data General-One, the Pro-Lite had a full-screen LCD that displayed 80x25 columns of text. He conceded that color LCDs were not a thing right now but insisted you could still do a lot of work with the black-and-white screens. Gaffney emphasized these machines were targeted at people who primarily worked in the field, such as salesmen, insurance agents, and other sales representatives.

The Texas Instruments Pro-Lite portable computer, sitting on a desk in the studio of “Computer Chronicles,” c. 1985.

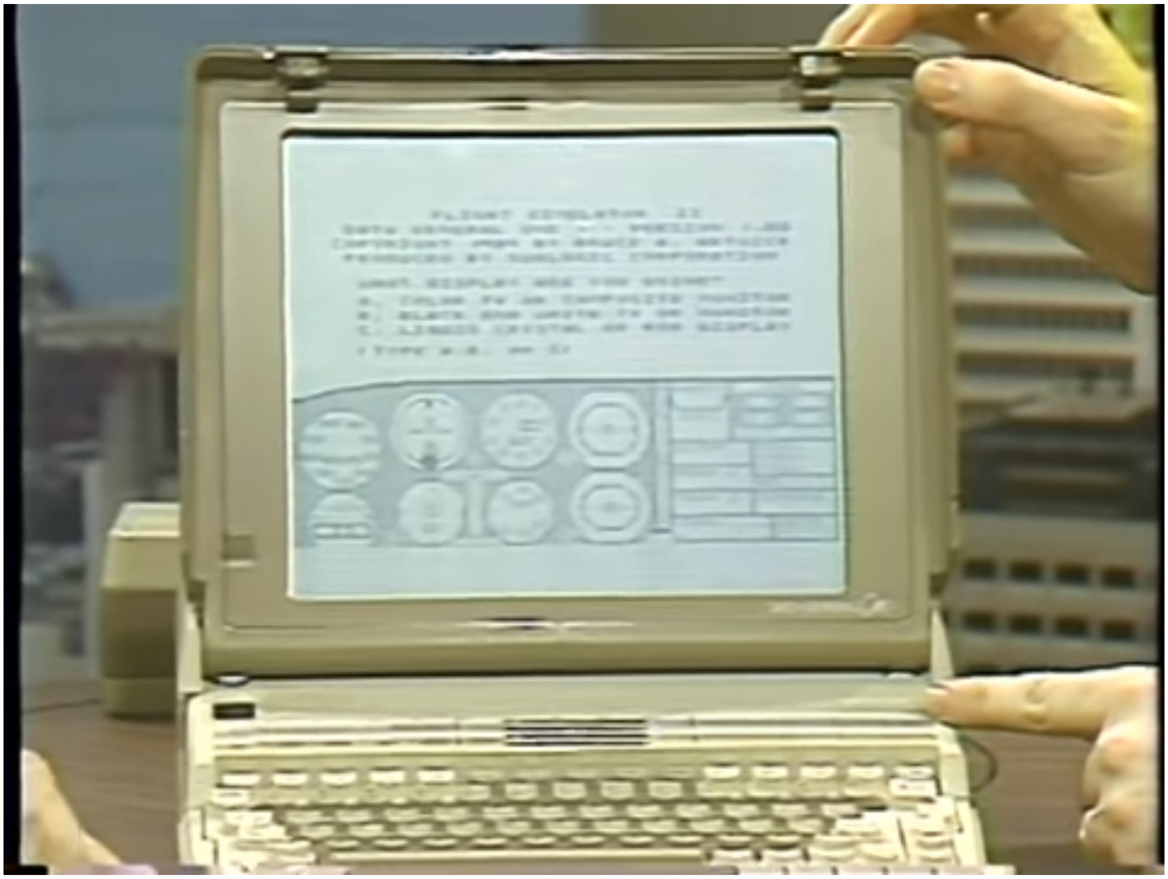
Kildall followed up on that point, asking if people actually used these portables as a primary computing device or merely as a peripheral. Gaffney said there were two uses. The first was as a general productivity aide, i.e., to help field workers be more efficient in entering orders and communicating with their home office. The second use was a new wave of applications that required computer technology to solve a particular problem, such as universal life insurance. This was a very complex field that required a lot of “What if?” analysis, and a portable computer allowed the insurance agent to do this while visiting a client on-site.

Kildall asked if such applications required a larger storage device beyond a floppy disk drive? Gaffney said no, not really. He added there was another new technology in the Pro-Lite–the 256 KB memory chip. That allowed Texas Instruments to put a total of 768 KB of user memory in the machine, meaning there was no sacrifice as far as desktop PC functionality.

Kildall pressed again about the availability of backup storage. Gaffney said the Pro-Lite came with either one or two disk drives. These were newer 3.5-inch microfloppy drives, which had double the storage capacity of 5.25-inch disk drives. Archer noted the Data General-One also used 3.5-inch diskettes, so with two drives the user had 1.5 MB of storage, which was really enough for most applications, particularly considering the number of programs that currently worked with two 5.25-inch drives that had a combined storage of 720 KB.

Cheifet asked about modems and communications, i.e., could these portables be ran as terminals? Were there built-in modems or were those separate accessories? Archer said the Data General-One had a 300 baud internal modem option that fit right inside the unit. It also included a built-in terminal emulator. He noted that many customers used the portable as a terminal with a larger Data General system plus a workstation. Gaffney replied that Texas Instruments took a modular approach, so the modem was a user-installable option.

Cheifet wanted to talk about the LCD some more, specifically the fact the Data General-One required 48 KB of its 128 KB of memory just to run the screen. Archer explained that in order to refresh an LCD you needed such a dedicated amount of memory. The 48 KB of screen memory therefore allowed for hi-resolution graphics to emulate IBM PC software, such as *Microsoft Flight Simulator*, which was displayed on the demo unit.



Microsoft Flight Simulator running on a black-and-white display of a Data General-One portable computer during an episode of “Computer Chronicles” from January 1985.

Kildall added that while these machines might start with 128 KB of memory, the standard today was really 256 KB. Having only one disk drive included also struck him as a limitation. So what about the overall pricing of these machines and their options? Archer replied that there were many third-party software packages that only required 128 KB of memory, so he felt that was a sensible baseline. As for having only one disk drive, the use of double-capacity 3.5-inch drives made up for the lack of a second drive standard. For example, he noted that *Lotus 1-2-3*–take a drink, everyone!–was now available on a single 3.5-inch diskette. That said, Archer noted that if a customer still wanted more than 128 KB of RAM, Data General was happy to sell it to them.

Kildall asked again about the price range. Archer said the base Data General-One cost $2,895 for 128 KB of RAM and a single 720 KB disk drive. If you wanted 256 KB of RAM and two disk drives, that would cost $4,095. Cheifet asked about the TI Pro-Lite. Gaffney noted the Pro-Lite came standard with 256 KB of RAM and one disk drive for $2,995. The user could also expand the memory up to 768

KB. He added that unlike Data General, Texas Instruments incorporated the screen memory into the LCD drivers. While some users thought this made the LCD slower, he believed the TI drivers made its LCD's response time comparable to that of a CRT.

The $31 Million Laptop That Never Made It

The final segment began with Wendy Woods' second remote feature, this time on the decline of Gavilan Computer Corporation, which attempted to market a briefcase-size portable computer that featured a non-standard 3-inch disk drive, an 8-line display, modem, and seven hours of battery life. Woods noted the machine–called the Gavilan SC–made a flashy entrance in the back of a limousine back during the spring of 1983 and, as Woods put it, "appeared to be the machine everyone was waiting for."

The Gavalin SC portable computer, a grey machine with a flip-up LCD screen, a keyboard, and a floppy disk drive on the right side.

Unfortunately, what Gavilan failed to see was that 3.5-inch diskettes, IBM compatibility, and a 16-line display were becoming standard for portable machines. Gavilan then delayed production of the SC by another year to try and reengineer its machine, which Woods said proved to be a fatal mistake.

Woods interviewed Jan Lewis, a former Gavilan vice president, who described the situation as a “classic case” of having state-of-the-art technology, a really wonderful machine, and what she said was the best sales staff she’d ever seen in the business–but Gavilan missed its window of opportunity. Lewis said the product was simply too late in getting to the market.

Over some B-roll footage of a bankruptcy auction, Woods explained Gavilan filed for Chapter 11 bankruptcy at the end of 1984, having only sold about 1,000 of its SC portables. Lewis noted that companies like Gavilan were often leaders in a technical sense, but they failed because they didn’t have enough funding or the market timing was just not quite right. So while Gavilan never made any money, it still contributed greatly towards advancing portable computer technology.

In the end, Woods said that Gavilan burned through $31 million in venture capital funding, making it one of the most expensive failures in the computer hardware market to date.

Color LCD Portables Coming Soon?

Back on set, Gary Kildall said in response to Woods’ report, “A story like that makes me glad I’m in the software business.” He added that the lesson from Gavilan’s failure was that there were a lot of different components that contributed to the success of a small computer system. With portables, he said the display needed to improve considerably, noting that in his own experience while traveling, light coming from different directions often caused the LCD to fade and become unusable.

With that preamble, Kildall asked one of our next two guests, George Morrow of Morrow Designs, Inc., to explain how his Morrow Pivot portable dealt with display technology. Morrow explained that LCD technology used existing light to give the user visual information. Another option, electroluminescent displays (ELDs), used their own power to create light much like a CRT. This made ELDs a good option for displays used primarily in environments with low-ambient light. In contrast, LCDs worked better than ELDs in environments with high ambient light.

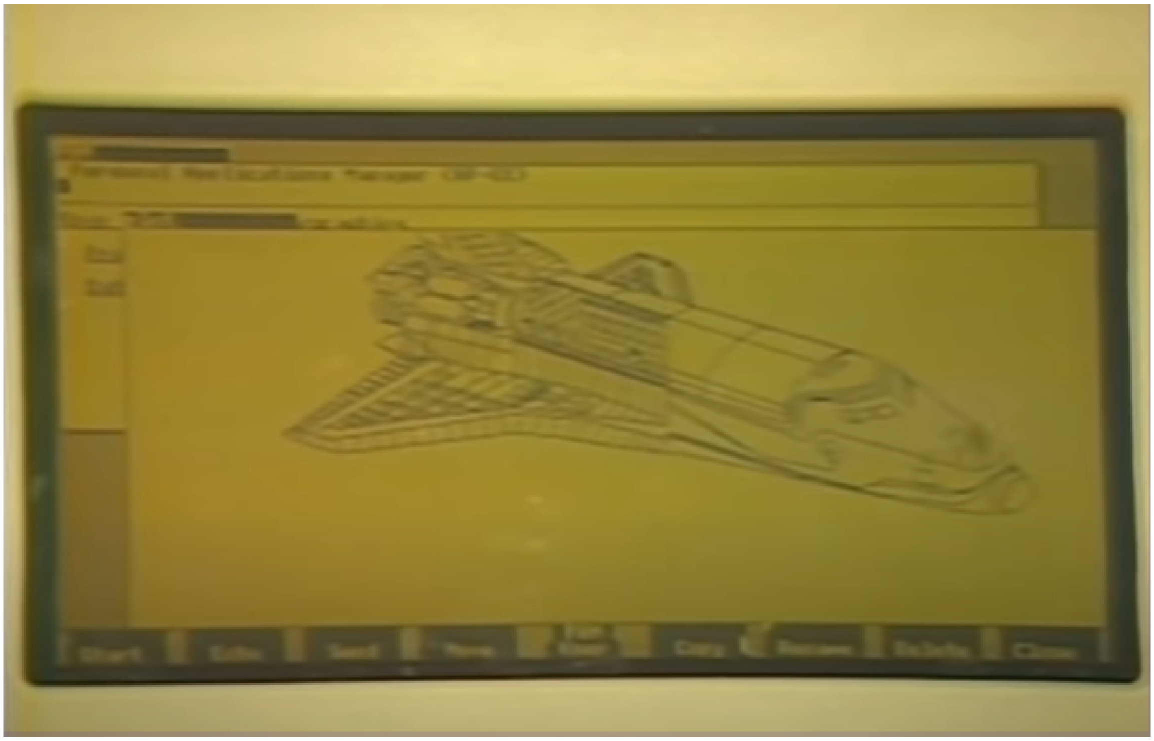
Cheifet asked how you could cover both of these scenarios. Morrow said the answer, which the Morrow Pivot used, was to backlight an LCD, thus giving it some electroluminescence. He noted these technologies were still in an evolving state. ELDs continued to get more efficient, so in the future they would give more light for less power. As for LCDs, the contrast would continue to improve over time, meaning the user would receive more visual feedback for a given amount of incidental light.

The Morrow Pivot personal computer.

Kildall asked about the work that Japanese manufacturers like Casio had been doing with developing color LCD technology. Could we see that move into computers as well? Morrow said the current focus of Japanese companies was developing flat-panel televisions. Even if they don't accomplish that, however, he believed that within a year you would start to see portable computers with LCDs that have at least two colors.

Cheifet then asked Morrow for a demonstration of the Pivot and an explanation of how it differed from the previously seen Data General-One and TI Pro-Lite. Morrow said that while the Pivot used an LCD like the other two machines, it had a 5.25-inch floppy disk drive included, as opposed to the 3.5-inch micro-floppy drive. Morrow pointed out that most popular PC applications–such as *Lotus 1-2-3*–came on 5.25-inch disks. Customers often had to pay an additional fee to get 3.5-inch diskettes.

Cheifet interrupted Morrow to ask his other guest, Hewlett-Packard retail marketing manager Srini Nageshwar for a brief demonstration of his company's product, the HP 110 Portable, which as previously noted utilized an electroluminescent display. The demo showed the HP 110's ability to produce hi-resolution, albeit monochrome graphics, in this case a detailed drawing of the space shuttle. (Morrow joked you could literally design an airplane in your hotel room with the HP 110.)



A drawing of the NASA Space Shuttle orbiter on the monochrome black-and-amber display of the HP 100 Portable computer.

Kildall moved onto discussing storage. He noted that while many parts of the portable computers were highly semiconductor-oriented, like the LCDs, the storage still relied on mechanical floppy disk drives. So how did these machines address backup storage? Morrow noted that in the HP 110, the user's data was kept in static memory. It was a lower-power form of CMOS static RAM that relied on a lead-acid battery. As for the Pivot, Morrow said it relied entirely on floppy disks. It might require more power and make the machine heavier overall, but he felt it provided the best functionality. More to the point, the floppy disk was a standard environment.

Nageshwar said the decision not to include any floppy drive on the HP 110, and instead rely on software built-in to static memory, was that it provided users with "instant availability." He noted that when was sitting at an airport and looking to get work done on his HP 110, he didn't want to take time to load a disk. Kildall quipped that perhaps airport terminals were the best place to sell portable computers. Nageshwar agreed, but Morrow decided to be a killjoy, pointing out that he traveled through airports frequently and never saw many portable computers in use.

Cheifet pounced on that and asked about the "real market" for these portables. Nageshwar said the market basically consisted of two groups: People who take work away from their desk and people who normally worked away from their desk. The first group included managers, executives, and professionals. The second group largely included salespeople. Nageshwar said the people in the first group usually needed the ability to run word processors and spreadsheets. They didn't need a huge suite of programs to run on their portables. As for the second group, they tended to be people who were "really abusing their machines," so their portables needed to put up with a lot of vibrations. Nageshwar noted the HP 110 Portable had been tested to withstand 100*g* of force.

Cheifet next asked Morrow to explain the difference between the Pivot and the HP 110 in terms of memory. Morrow replied the Pivot used standard-loss dynamic RAM, which used more power. But later this year Morrow Designs would move towards a CMOS-based RAM that offered a power of reduction by a factor of eight. He said this was probably the best compromise between static and dynamic CMOS memory. The CMOS dynamic RAM didn't require as much silicon in terms of area on the chip but the amount of power used was virtually the same as for CMOS static RAM.

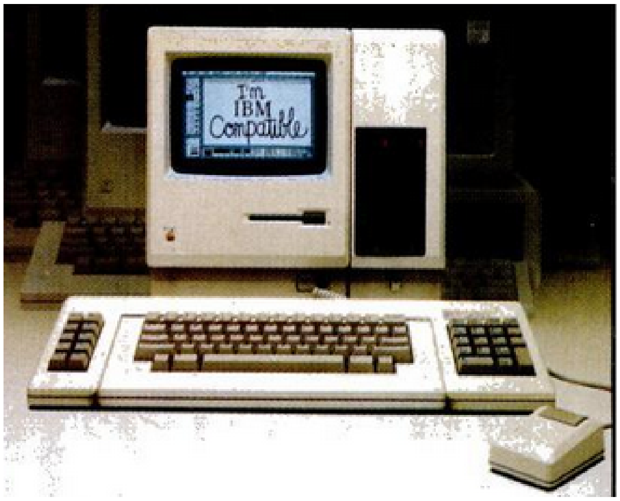
Kildall moved the conversation to price, noting that Morrow Designs was known for its lower-end prices. What was the price of the Pivot? Morrow said the Pivot started at $1,995, although he believed in the future these type of machines should be priced around $1,000. The $1,995 unit included the Pivot with a single 5.25-inch disk drive and 128 KB of memory. He noted the natural price of a very high-end machine should be around $2,000 and a good utilitarian machine should be around $1,000.

Cheifet then asked Nageshwar about the HP's pricing. Nageshwar replied that the 110 Portable–which included about $1,000 worth of software built-in to static memory–started at $2,995. He said there was also a model that came with a transportable, floppy-based UNIX system for $4,995.

Utah Company Finds a Way to Make the Mac an IBM Compatible

Stewart Cheifet presented this week’s “Random Access,” which dates the episode in late January 1985.

- A small California company called Novix said it developed a new chip that would allow microcomputers to run at mainframe speeds. The Novix NC 4000 reportedly ran 10 times faster than the Motorola 68000, the fastest 16-bit chip currently available. Novix said its chip had 80 percent fewer components than traditional chips and relied on Forth as its machine language.
- Japan’s NEC announced it had a new process for developing optical discs that relied on organic dyes as opposed to conventional metal dyes. NEC said this meant it could produce laser discs at one-tenth the cost. Cheifet added this could also speed up development of rewritable optical discs for use in computer storage.
- Digital Systems announced a new service called SoftCast that would distribute radio programs to over 1,000 stations across the country, which would include computer data. Cheifet said the plan was to sell software directly over the radio network and provide the first “broadcast-based computer information service.”
- Ziff-Davis announced its new Computer Industry Newsletter, which would be edited by Esther Dyson. The newsletter would be published exclusively over computer terminals, which would receive new issues each evening at 6 p.m.
- Cheifet said there were hints that IBM may be developing a new low-cost replacement for the PCjr. An IBM executive also confirmed the company would start making its own hard disk drives to resolve some of the problems with the IBM PC AT.
- Paul Schindler provided his weekly software review, this time for database manager *dBase III*from Ashton-Tate. Schindler said he personally used the software to index his own professional articles, but that it was “not for everyone,” as it was complicated and not novice-friendly. It was also expensive at $700.
- Utah-based Dayna Communications said it had come up with a solution for people unable to decide between buying an IBM PC or an Apple Macintosh. The company’s new product, the Mac Charlie, allowed Mac users to run PC software while PC users could take advantage of the Apple machine’s mouse, graphics, and user interface. Cheifet said the Mac Charlie would sell for $1,200.



"I'm IBM Compatible" displayed on an original Apple Macintosh with the Mac Charlie addition, including a rectangular PC box attached to the side of the Macintosh, and keyboard extensions including a function keypad on the left side and a numeric keypad on the right side.

- Koala Technologies announced its latest product, the KoalaCat, a touch-sensitive pad that allowed users to move the screen cursor with their finger.
- Finally, the California Department of Motor Vehicles was in the process of converting to a fully computerized system. Cheifet said the DMV currently had a backlog of 87,000 transactions, which was growing by 20,000 additional transactions each month. This left thousands of residents stuck with expired registrations and licenses. The DMV admitted it "grossly underestimated" the problems of converting to computers. The agency was now asking for $5 million to hire new people and pay for overtime so that "humans [could] clean up the mess."

Morrow Designs Undone By Massive Debt

Two of the four companies that demonstrated portable computers in this episode, Data General and Morrow Designs, are no longer in existence. Data General, founded in 1968, originally made a name for itself selling the NOVA minicomputer, which "quickly became a popular machine in scientific and educational markets," according to the Computer History Museum. By the mid-1980s, Data General's fortunes had started to slump as microcomputers were becoming more popular. The Data General-One represented the company's attempt to make inroads in the consumer market. It apparently didn't take. Towards the end of the decade, Data General pivoted to producing UNIX-based machines. In the 1990s, the company moved away from computers altogether and decided to focus on storage devices, culminating in its 1999 acquisition by EMC Corporation.

As for Morrow Designs, its decade-long run as a small computer manufacturer abruptly came to an end in March 1986 when the company filed for bankruptcy. According to Nancy Groth of *InfoWorld*, Morrow Designs had run up $5 million in debt and reported a $7 million operating loss. And while the company had recently licensed its final portable computer design, the Pivot XT, to Zenith Data Systems to fulfill an order for 15,000 computers from the Internal Revenue Service, Morrow Designs would receive no royalties from that deal, just a flat fee of $1 million. George Morrow himself told Groth that the Zenith deal was just one reason for the company's demise. Morrow also cited an overall downturn in the computer industry and the simple fact "the company borrowed too much money."

Ironically, George Morrow is probably better remembered today for his affiliation with *Computer Chronicles* than with his eponymous computer company. This episode marked the first of Morrow's many appearances on the program during the rest of the 1980s and early 1990s. He will serve as substitute co-host in Gary Kildall's absence and later provide some of the end-of-episode commentaries.

Archer, Nageshwar Had Long Careers in Tech

Rowland Archer spent nearly 25 years at Data General, remaining with the company until 1992. In 1995, he joined HAHT Commerce as its chief executive. Global Exchange Services later acquired HAHT, and Archer remained with that company–later renamed GXS–as a senior vice president and chief technology officer. Archer moved to ReadSoft, a Swedish company that developed specialized business application software, in 2010 to oversee its U.S. subsidiary, which focused on integration with Oracle-based systems. He remained with ReadSoft until 2015.

Like Archer, Srini Nageshwar also had a quarter-century run at a legacy tech company, in his case Hewlett-Packard. Nageshwar was with HP from 1964 until 1989. In 1991, he became chief executive of the European branch of Iomega, the company best known for manufacturing the Zip drive. After retiring from Iomega in 1998, Nageshwar joined the board of directors of TVS Electronics Ltd., an India-based company, where he also chaired the audit committee until 2008. Since 2001, Nageshwar has been the chief executive of DyAnsys, an India-based manufacturer of medical diagnostic tools that assist patients with chronic pain management.

I don’t have much to report regarding our other in-studio guest, Faris Gaffney, formerly of Texas Instruments. I found sporadic references online to his employment with Scientific-Atlanta and Interstate Electronics Corporation, both companies that apparently specialized in telecommunications equipment, with Gaffney joining the latter in 1996.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of January 22, 1985.
- The Seiko UC-2000 featured by Stewart Cheifet during the introduction wasn’t exactly a smartwatch in the modern sense. Riccardo Bianchini described it in a recent article as a “programmable calculator” that could be paired with a dock station, which included a ” small thermal printer, a keyboard, 4 KB of RAM, and a 26 KB ROM which included a Microsoft Basic programming software, a Japanese / English translator, and some games.”
- In a December 1998 essay for *Inc.*, Gavilan Computer Corporation co-founder and CEO Manuel Fernandez said his major mistake was that he “stopped at $30 million” in venture capital funding and turned down an opportunity to raise another $60 million because “my cofounders and I were intent on trying to hold on to the equity of the company.” As a result, Gavilan simply ran out of cash before it could get its Gavilan SC laptop to market.
- Much like George Morrow, another person featured in this episode, former Gavilan executive Jan Lewis, will become a regular guest on *Computer Chronicles* going forward.
- The Novix chip didn’t just use Forth as its machine language. Novix was actually co-founded by Chuck Moore, the creator of Forth.
- The Ziff-Davis Computer Industry Daily did not last long. The publisher pulled the plug after just three months. According to the *New York Times*, potential readers “greeted the $1,000-a-year paper with all the enthusiasm of consumers eyeing the 40th I.B.M.-compatible personal computer.” Esther Dyson went back to publishing her own industry newsletter, *Release 1.0*, which she originally started in 1983 and continued to write until 2006.
- While it sounded ridiculous to me, the Mac Charlie was a real thing. *InfoWorld* described the product as “a box that surrounds the Mac and

contains an Intel 8088 coprocessor, a self-contained 5.25-inch disk drive, and several additional ports.”
- It’s been 36 years, but I bet the California DMV *still* hasn’t gotten through that backlog.

Chapter 6: The Adaptive Firmware Card, Express 3, and Kurzweil Reading Machine

Up to this point on *Computer Chronicles*–we're now at February 1985 in terms of broadcast dates–the featured computers have largely relied on typewriter-style keyboards as input devices and cathode-ray tube monitors for output. (Even the mouse had only started to enter more general usage with the 1984 release of the Apple Macintosh.) But in this next episode, the focus is on individuals who have different accessibility requirements when it came to using computers.

In the studio introduction, Cheifet showed Gary Kildall a small handheld computer that was capable of speech synthesis. (The make and model was not identified.) Cheifet noted that if he were speech or hearing impaired and needed to make a telephone call, he could hook up this device up to the phone and let the computer speak for him. He asked Kildall if these computer applications originally designed for the disabled would "spin off" and help everyone. Kildall said he thought that worked both ways. He cited the technology being developed for the Mars rover projects, which included robotics and vision processing. He observed such technology could lead to the future development of something like a mechanical seeing-eye dog for the blind.

Ultrasonic Wheelchairs That Rely on Head Movements

Wendy Woods presented her first remote feature, which began with an "example of how hidden computers can help some people regain lost movement." Specifically, she discussed a motorized wheelchair that relied on ultrasonic sensors rather than a joystick or another physical attachment for operation. The sensors enabled the user to simply point their head in the direction they wanted to go. Two ultrasonic sensors on the back of the chair reflected sound waves off of the user's head and then measured the difference in time for the waves to return. This enabled the chair's computer to decide if the user was pointing their head left, right, or straight ahead to indicate their desired direction.

Woods then shifted to explaining how the "standard desktop microcomputer" offered a different kind of assistance to mobility-impaired individuals. She narrated some B-roll of an unidentified man using an aluminum keystick to type on a standard keyboard using his mouth. Woods noted this individual used his machine mainly for his work as a computer programmer. But it was the computer's more routine talents–such as word processing, communications, and online database access–that played a pivotal role in expanding and simplifying his daily life. For example, a modem allowed the user to send and receive messages through a bulletin board system and access an educational library through the Plato database system. In short, Woods said that for many disabled users, an ordinary microcomputer could mean the difference between reliance and self-reliance.

Exploring Alternative Input and Output Devices

Back in the studio, Cheifet and Kildall conducted their first round table with Peggy Barker and Sue Simpson. Cheifet noted that Simpson had suffered a stroke six years earlier, which led to her near-total paralysis and the loss of speech. Barker, a rehabilitation engineer with the Children's Hospital at Stanford University, was there to demonstrate several accessibility devices that she used with her clients.

Barker's first demonstration involved the Adaptive Firmware Card, an expansion card for the Apple II computer line that allowed users to connect alternate input devices. Barker used a special keyboard called the Unicorn Keyboard that plugged into the Adaptive Firmware Card. The Unicorn Keyboard was a programmable membrane keyboard. In this case, Barker said the Unicorn was setup to store whole words and phrases. This allowed someone with limited physical ability to input entire words or phrases so they could still access commercial software.

Kildall asked if you could change the vocabulary of the Unicorn keyboard. Barker said yes, it could be adapted for other applications such as word processing. In this particular case, the Unicorn was set up to work with severely disabled children, specifically those with cerebral palsy. She explained these children had limited "fine" motor control but good "gross" motor control. Kildall joked this type of keyboard would be ideal for playing text-based adventure games.

Cheifet then asked about a client who didn't even have the ability to press the buttons on a membrane keyboard. Barker said there was another device, which she described as a "head wand," which she used with clients who suffered from amyotrophic lateral sclerosis (ALS). Barker demonstrated this head wand, which allowed the user to control switches merely by blinking their eyes.

Cheifet then turned to Simpson, who used a device called the Express 3 to communicate following her loss of speech. Barker explained the Express 3 allowed Simpson to communicate using a built-in LCD or by typing out a message to a printer. The Express 3 also had speech synthesis capabilities. Simpson, who could not type, selected her messages by using a long-range light pen on a large control panel filled with rows and columns of LED "switches."

Simpson explained that with the Express 3, "The memory storage is like a hotel with 128 floors and 100 rooms on each floor. I have almost unlimited storage." She then demonstrated the voice synthesis function by saying her name.

Cheifet asked Barker about how difficult it was for Simpson to learn the Express 3. Barker said the hardest part was developing head control. But she added that Simpson was "incredibly determined" and picked it up much quicker than most of her other clients. Kildall said he talked to Simpson before the episode, and she mentioned that she did not have this type of device for several years following her stroke, but when she got the Express 3 it opened up the whole world of communications for her. Cheifet asked how fast Simpson could speak using the Express 3. Simpson said she could not adjust the speed of the speech synthesis.

The Computer That Can Read for You

The final segment began with Cheifet talking to Sue Melrose, a computer evaluator at the Veterans Administration Medical Center in Palo Alto, California, about her work with the Kurzweil Reading Machine, which was also on-set for a demonstration. Cheifet asked Melrose, who is blind, how she read or conducted research prior to using the Kurzweil. Melrose said for research, she would hire a person to read the text to her directly or onto an audiotape. But that was slow, and even listening to a tape took almost as much time as reading.

Cheifet then asked how the Kurzweil worked. Melrose said it was a “reading machine.” It looked much like a photocopier. The user laid a printed page on top and a camera would then scan the text line-by-line and output the content using voice synthesis. Cheifet then put in a sample page of text to demonstrate.

Melrose said she could use a control panel on the included software (running on an Apple II machine) to move the camera around, re-read something in memory, spell out words, and even read out punctuation. Cheifet noted the Kurzweil had a little bit of artificial intelligence built into it. Melrose explained that the Kurzweil often failed to read the first few lines of a text correctly. Part of the reason was that the machine would analyze these first lines to see if it mistook one letter for another–say, reading a “g” with the tail missing as an “a.” The Kurzweil could then reanalyze the text and correct its mistakes.

Cheifet said that in addition to outputting text to the speaker, the Kurzweil could also load it onto a computer, in this case the Apple II. Melrose said yes, and this feature was commonly used to translate texts into braille. Melrose said she often used a special word processing program called *Braille Edit* to read through the Kurzweil’s transcription and correct any errors.

VA Researchers Study Converting Industrial Robots to Service Humans

Wendy Woods returned to present her second remote feature, this time from the Palo Alto Veterans' Administration medical center. She explained that a robot once designed to serve as an arc welder on an assembly line was now being adapted to serve the handicapped. Woods spoke to Bob Yee, one of 125 disabled people participating in the VA's research project into the use of robotics. The robot itself ran off a Zilog Z80 microprocessor and could respond to a dozen voice commands and do "just about anything a human arm and hand could do," such as playing chess or picking up a water glass.

Karen G. Engelhardt, the principal investigator on the research project, told Woods that the goal was to look at general purpose tools that could not only be used by a person with disabilities, but also something that people like her and Woods would want in their own homes. She said that the more people who were willing to purchase these types of robots, the sooner the technology would get to the people they were designing it for.

Yee told Woods that he currently required people to feed him and do all sorts of things that he could not do for himself. But if he had a device like this robotic arm, it would give him a lot more independence from other people. In narration, Woods said Yee's dream of independence could soon be a reality. She said at least three companies were closely watching the VA's progress in robotics and planned to mass produce the technology soon. Meanwhile, the designers at the Palo Alto facility were hoping to have the robot on wheels by May 1985.

The Future of Accessible Tech: Talking Screens?

For the final studio round table, Noel Runyan joined Cheifet, Kildall, and Melrose. Runyan, who is blind, was working on the IBM Talking Tablet. Before getting to that, however, Kildall decided to go off on a tangent and asked the guests about a "vision substitution project" he heard about 10 years ago that used a camera in conjunction with a tactile-feel device that let the user "sense" what was on the camera. Kildall wanted to know if anything ever came of this technology? Runyan said he knew of a couple of different projects like that, including a reading machine developed by a Stanford researcher that let the user read print with their finger. There were also larger systems that could be used to recognize something like a telephone, but most of those were still in the primitive research phase.

Melrose said she actually participated in one such study conducted by the Smith-Kettlewell Eye Research Institute. She said after half an hour, she could learn to distinguish a teapot from a teddy bear. So she agreed with Runyan that this technology was still in a primitive state.

Kildall then asked about the possible use of sonar. Melrose said there were some mobility aids that used sonar feedback. You could get textural cues and grasp how far away an object was, or whether it was to your left or right, but it didn’t help with identification. Kildall asked if further research into such technology might bear fruit later. Melrose said it could but it needed a lot more work. She said that it was important to not only develop the technology, but also understand what a blind person needed to learn in order to interpret the signals for things such as dimensionality. Runyan added it needed to be the proper kind of information because you could end up running into a wall if you were too busy trying to interpret the machine.

Cheifet then asked Runyan about his own work in the area of audio assistance for the visually impaired. Runynan said his project was called the Talking Tablet. The idea was to use the raw power of the IBM Personal Computer and put it into a portable package that used touch-directed audio. Essentially, there was a tablet with a computer screen and wherever the user touched the screen there would be corresponding speech for that information. Runyan did not actually have a working tablet, but he demonstrated the speech synthesis on an IBM PC.

Bringing Down the Cost of Accessible Technology

Finally, Paul Schindler presented his commentary on the episode’s theme. He noted that almost everything that he could do on a computer today, such as preparing expense accounts or writing articles, was once done manually–and sometimes it was faster and more efficient that way. But when it came to computers and the disabled, that was an area where computers could do things that simply could not be done before.

Schindler said one example was online conferences. He noted that disabled individuals often had trouble participating in meetings. With a computer conference, however, these speech or motion difficulties vanished. Computers thus served as a job equalizer allowing the disabled to work, which opened up opportunities for 36 million Americans.

Schindler also noted that while most of the computing devices used by the disabled cost nothing extra, there was that “last 8 percent” that could cost a user $2,000 or more. He blamed manufacturers for these high prices and implored them to find a way to bring the costs down.

A Good Week for Hackers, A Bad Week for the IRS

Stewart Cheifet presented this week’s “Random Access,” which dates the episode in February 1985:

- Cheifet noted “this was not a good week for computers.” First up, an Internal Revenue Service computer failed to process tax withholding payments from about 10,000 employers. This led a second computer to automatically send notices to the employers threatening to seize their assets. IRS clerks sorted out the problem after reconciling the records manually, Cheifet said, and no assets were seized.
- Hackers managed to gain access to a Sprint long-distance telephone code. The hackers ran up $5,000 in calls before Sprint caught on. But it still took the telephone company 10 days to change the compromised code, during which time the hackers made 17,000 calls. The code belonged to a Sprint customer who subsequently received a 772-page bill totaling $60,000. On the plus side, Cheifet joked the customer received an $8,000 volume discount.
- Some other hackers managed to compromise the University of Southern California’s transcript computers and sold phony doctorate degrees for $25,000.
- In non-hacker news, the National Cancer Institute announced its first online cancer treatment database, which would allow any doctor to

access up-to-the-minute information on clinical studies, treatments, and facilities with special treatment programs.

- The Stanford Center for Computer Research in Music–previously featured on *Computer Chronicles* back in February 1984–said it had developed a computer that could listen to music and turn it into a written score. It took the machine about 5 minutes to score 1 minute.
- Paul Schindler returned with his software review, this time for *PFS:Plan*, which he described as "the spreadsheet for the rest of us, not the power users." The $140 program allowed users to create a spreadsheet of 64 columns by 176 rows.
- Cheifet said the Campbell's Soup company had developed robots to work in its New Jersey food processing plant. But the problem was plant regulations required all equipment to be washed down frequently for cleanliness. Since robots didn't take well to water, Cheifet said Campbell's was now developing "raincoats for the robots."
- Apple co-founder Steve Wozniak said he was taking another step back from the company to start a new venture he dubbed "My Best Friend," which would develop home entertainment products.
- Speaking of Apple, Cheifet said a reporter touring the company's Macintosh production facility noticed it used a robotics system developed by rival IBM.

Adaptive Firmware Card Allowed Users to Control Apple II Using Morse Code, Other Methods

The Adaptive Firmware Card (AFC) demonstrated by Peggy Barker was an interesting piece of the technology that apparently enjoyed success within its market niche. The first reference I found to the AFC was a September 1982 article in *Byte* co-authored by Paul Schwejda of the University of Washington and Gregg Vanderheiden of the Trace Research and Development Center in Wisconsin. They described the AFC as,

> a low-cost adaptive-firmware card that can be inserted into an Apple II microcomputer to provide a variety of "transparent" input routines including scanning, Morse code, and direct selection techniques. (The

> term “transparent” here indicates the routines work in conjunction with other programs without requiring that the programs be altered in any way.) In addition to providing ‘keyboard’ input, the car can simulate the use of game paddles and switches for people who cannot use the game paddles themselves.

Schwejda and Vanderheiden said there were 10 different input modes available on the original AFC. A later manual described seven “broad categories” of input, including the aforementioned Morse code method–where the user made inputs using a switch–and the “expanded keyboard method” utilized by Barker in her *Chronicles* demonstration.

Barker apparently used the Unicorn Expanded Keyboard, a separate device that effectively functioned as a touch-sensitive tablet. Although the Unicorn and the AFC working in conjunction could theoretically control any off-the-shelf Apple II software, individual programs still needed to be configured to work properly. (The blog *Pix’s Origin Adventures* published a post in 2014 where the writer attempted to configure the AFC to work with a number of popular 1980s Apple II games with mixed results.)

The AFC was in active development through at least 1988, as a version of the card was produced that year for the Apple IIgs. Don Johnston Developmental Equipment, Inc., was listed as the publisher of the AFC’s software and the product’s distributor. Don Johnston also sold the Unicorn keyboard, which was manufactured by an Oakland-based firm called, appropriately enough, Unicorn Engineering. Don Johnston itself is still in business today.

Perhaps echoing Paul Schindler’s commentary, these devices were not exactly cheap by 1980s standards. A March 1988 paper I found on the Internet Archive said Don Johnston sold the AFC for $400, with the Unicorn keyboard running an additional $295. For reference, the Apple IIgs (without a monitor) sold for around $1,000 at its 1986 launch, so the complete alternative input system that Barker showed off added an additional 60 percent to the Apple’s retail price.

Sue Simpson Inspired Open Source Accessibility Software Project

The device demonstrated by Sue Simpson, the Express 3, was manufactured by the Prentke Romich Company, which is now known as PRC-Saltillo and based in Ohio. Ed Prentke and Barry Romich started the company in 1966 to create devices to help disabled individuals. They released their first microprocessor-based product, the Express 1, in 1979. The Express 3 seen in the *Chronicles* episode was released in 1982 and was the first device that actually produced synthesized speech.

In the late 1980s, Simpson started working with an independent software developer, Jon Bjornstad, to help her deal with some of the problems she was having with the Express 3. Many years later, as Simpson's original device started to deteriorate, Bjornstad decided to create his own software to assist people like Simpson. Named *Sue Center* in Simpson's honor, Bjorstad made his program open source and freely available to anyone who needs it. Mike Cassidy described Bjornstad's software in a 2009 article for the *San Jose Mercury News*:

> *Sue Center* relies on a small camera tracking a reflective dot worn on the user's forehead. When a user moves her head, the cursor glides across the screen. Holding the cursor over commands, letters and icons has the effect of clicking on the item.
>
> *Sue Center* allows users to create text documents; send e-mail; request photographs, jokes, horoscopes, weather reports and news from the Web. Users can play MP3s, store photos, make phone calls using Skype. It can serve as a television remote or as an on-off switch for electrical appliances.

I'm not sure as to the current status of this project. Bjornstad has not updated his project website since 2011 and the code repository no longer appears to be active. As for Sue Simpson, Cassidy noted she had passed away, but no date was given.

Kurzweil Found a Practical Use for Optical Character Recognition Technology

The Kurzweil Reading Machine (KRM) is easily the best-known piece of technology featured in this episode. It was the signature invention of Ray Kurzweil, who developed the first optical character recognition (OCR) program in the 1970s. But as Kurzweil put it in a 1999 book, OCR was still a "solution in search of a problem." That was until one day when Kurzweil said he "happened to sit next to a blind gentleman on a plane flight, and he explained to me that the only real handicap that he experienced was his inability to read ordinary printed material."

Kurzweil Reading Machine

Inspired by this chance meeting, Kurzweil combined his OCR program with a flat-bed scanner and a text-to-speech synthesizer to create the KRM. After a flurry of early media coverage, Kurzweil managed to attract a major investor–Xerox, which purchased Kurzweil's company and associated technology in 1980. Xerox continued to refine and produce the underlying OCR technology, now known as Xerox TextBridge.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of February 11, 1985.

- As of 2019, Peggy Barker continued to work as an assistive technology consultant based out of northern California.
- In recent years, Noel Runyan has become a well-known activist in the area of accessibility and voting rights. In particular, he's been critical of electronic voting machines, which he described as "garbage" to the *Guardian* in 2019.
- From the 1990s until at least the late 2000s, Sue Melrose worked as an instructor at the Hadley School for the Blind in Illinois.
- After completing her three-year robotics study at the Palo Alto VA, Karen G. Englehardt went on to work as a senior research scientist at Carnegie Mellon University in Pittsburgh, where she founded its Center for Human Service Robotics. She later worked for NASA's Jet Propulsion Laboratories. In her early 60s, she decided to become a science teacher and continued to work at a California middle school well into the 2010s.
- Gary Kildall's reference to the Mars rover was a little confusing. I assume he meant the two *Viking* spacecraft launched by NASA in 1976–although the first Mars "rover" was successfully landed by the Soviet Union in 1971. What we commonly think of today as the Mars rovers did not launch until the 1990s.
- As for Gary's prediction of a future with robotic seeing-eye dogs, that has not yet come to pass, although Japanese tech company NSK famously announced a prototype for such a device back in 2011.
- Steve Wozniak's startup would actually be called CL 9, not "My Best Friend," and it made programmable universal remote controls based on the same MOS Technology 6502 microprocessor that Woz used to create the Apple I and Apple II computers. CL 9 only stayed in business for three years before Woz sold off the assets in 1988.

Chapter 7: UNIX System V SVR 2, BSD 4.2, and the HP Integral PC

In 1969, a computer scientist at Bell Labs named Ken Thompson wrote an operating system for a Digital Equipment Corporation PDP-7 minicomputer that he initially dubbed *Unics*. This was later renamed *UNIX* and continued to be developed at Bell throughout the 1970s, with each numbered version corresponding to the current edition of the accompanying *UNIX Programmer's Manual*. In fact, just a few days ago marked the 50th anniversary of UNIX Version 1, dated November 3, 1971.

Under a 1956 antitrust consent decree with the U.S. Department of Justice, the Bell System (which owned Bell Labs) could not market UNIX as a commercial product. Nevertheless, Bell offered highly restricted UNIX source code licenses to corporate and educational customers. Basically, these licenses offered UNIX "as is" without any warranty or commercial support.

One of these early UNIX licensees was the University of California, Berkeley. While on sabbatical from Bell Labs in 1975, Thompson helped Berkeley install what was then UNIX version 6. Berkeley then created its own derivative that became known as the Berkeley Software Distribution (BSD) 1.0.

Fast forward to 1985. Another federal antitrust case led to the breakup of the Bell System into AT&T and several regional telephone companies. One consequence of this was that the 1956 consent decree's prohibition on marketing commercial products no longer applied. This meant AT&T, which retained ownership of UNIX, could now offer it as a commercially supported product. This led to the release of UNIX System III in 1982, followed by UNIX System V in 1983. (Don't ask me why there was no System IV.)

This leads into our next *Computer Chronicles* episode from early 1985, which focused on the current state of UNIX. At this point the most recent AT&T release was UNIX System V, version 2 (SVR2 or 5.2) and BSD was now at version 4.2. There were also several other UNIX derivatives active on the market, such as XENIX (originally developed by Microsoft and based on System III), SunOS (a BSD 4.2-derivative used by Sun Microsystems), and the newly created HP-UX (a

Hewlett-Packard System III derivative), which was featured in one of this episode's product demonstrations. ## Eunuchs on a Computer Show?

Stewart Cheifet did his cold open for this week from some unidentified facility running a bunch of UNIX machines. We see one man running an Amdahl 580 mainframe. Cheifet noted that while there was a time when UNIX was only used on these types of large computer systems. But nowadays, UNIX was showing on personal computers, such as the Radio Shack TRS-80 Model 16B. Could this mean UNIX will become the next MS-DOS?

In the studio, Cheifet relayed this anecdote to Gary Kildall: "Gary, I told a friend of mine we were doing a show on UNIX. And he said to me, 'Why in the world would you want to feature a eunuch on a computer show?'" The moral of the story, Cheifet said, was that while some computer people were talking about nothing but UNIX, many personal computer users didn't even know what UNIX was. So why all the sudden excitement about UNIX? Kildall replied that the excitement wasn't really sudden. UNIX itself had been around since the late 1960s. The problem was that microcomputers didn't have the power to support UNIX in terms of memory, hard disk capacity, processor speed, and so forth. Now there were micros that did have such power, which made UNIX a serious contender for an operating system standard.

Could UNIX Prove Itself on Micros?

Wendy Woods' first remote segment for the week featured B-roll of UNIX-based computer systems in use at the University of California, Berkeley. Woods noted the original UNIX developed at Bell Labs in the 1960s was later adopted by the University of California for academic research and publishing. Here at Berkeley, the history of science department relied on a network of UNIX terminals to typeset their journals and directories.

Why use UNIX? Woods said that apart from the fact a major version of UNIX was developed at Berkeley, UNIX was an eminently portable system that ran on everything from micros to minis to mainframes. UNIX could be easily adapted to these different systems with few or no changes required.

Woods said that the typical UNIX network ran on minicomputers. User-initiated tasks were distributed among the computers through port selectors. But the advantages of UNIX were not limited to multi-user portability. The system was also fast and powerful. Once the user had mastered UNIX's "unorthodox" commands, Woods said they were rewarded with some very sophisticated features such as background processing. This meant that after initiating a task, the user could initiate a second task while the system continued to work on the first.

Surrounding the kernel of the UNIX system, Woods said, was a shell or central command interpreter that redirected applications, controlled input and output, manipulated files, and stored command sequences. The shell structure was user-friendly and allowed even a first-time user to perform complex tasks. Indeed, Woods said that UNIX users gave the system high marks for versatility, but up until now the operating system had been largely confined to a small group of specialized users. The question was whether or not UNIX could prove its value to the "rest of us."

"The Normal Behavior Was to Find a Guru or Wizard and Chain Him to the Machine"

In the studio, Mark Sobell and John Mashey joined Cheifet and Kildall. Cheifet asked Kildall to provide a brief background on UNIX. Kildall explained that UNIX had "come down from" the world of minicomputers to microcomputers. UNIX carried with it the C programming language, the UNIX file system, and the UNIX interface. Kildall noted the C language in particular was wildly successful on a lot of operating systems, although the user interface still needed to be addressed, as it was considered unfriendly.

With that, Kildall asked Sobell, the author of *A Practical Guide to the UNIX System*, to demonstrate an application that aimed to make UNIX more user friendly. Sobell explained that UNIX involved using a lot of short commands, as it was originally designed for terminals that ran slowly off of teletypes. Today, you were seeing more applications built with user interfaces derived from MS-DOS. Using an AT&T-branded UNIX workstation, Sobell demonstrated one application, called *File It*, which he said incorporated UI elements from *Lotus 1-2-3*.

Kildall said that one of the ideas pioneered by UNIX was the idea of software portability–i.e., you could move an application around to various types of computers. Mashey, who worked on UNIX at Bell Labs in the early 1970s and was now with MIPS Computer Systems, said that was probably the most important aspect of UNIX. He said UNIX started out on some Digital Equipment Corporation machines and had since been moved to between 50 and 100 different kinds of processors. That was important because if you were investing a lot of effort to build software, it was helpful to know that you could move it around, say from a personal computer to a large mainframe.

Kildall added this was also true for software designers, because they could take a language like C and its standard runtime library and write an application that would run on UNIX as well as MS-DOS or Digital Research's Concurrent DOS. Mashey noted that it was the fact you could move C programs very easily that also made it possible to move UNIX to other machines.

Kildall noted that one criticism of UNIX was that it had been unreliable. Was that still the case? Mashey said he thought UNIX was fairly reliable these days. He (semi) joked that, "originally when you got your UNIX system, the normal behavior was to find a guru or wizard and chain him to the machine," so that someone was there to pick up the pieces when the computer broke. That was around 1972-1973, he said. But as UNIX started moving into computer centers and more people depended on it, a lot of work was done to make it a much more reliable system. Today, UNIX was used in some fairly demanding applications. He added that one thing many people didn't realize was that UNIX touched them through the telephone system almost every day–if you wanted to get your phone fixed, the system that tracked all that work was run by UNIX.

Cheifet chimed in at this point, noting that while Sobell's earlier demo showed how you could "friendly up" UNIX to make it look like MS-DOS, why should the average PC user care? What did they get from a UNIX-based application that they couldn't get from a DOS application? Sobell replied that everyone didn't want UNIX. If a user had a DOS system running their applications and it did what they needed it to, then maybe UNIX wasn't for them. As for the advantages of UNIX, Sobell said it was a multi-user operating system. For example, he could perform a query and look at data while at the same time another user could change that same data or run a graphics or word processing package on the same machine. So everyone didn't need to fight over one machine.

Sobell also reiterated that UNIX was a multi-tasking operating system. Kildall pointed out that UNIX was no longer the only microcomputer operating system with that feature. He noted that IBM's forthcoming *TopView* would have multi-tasking, and his own Concurrent DOS did as well. Sobell added that at some point in the future, local area networking would be a viable alternative to the traditional multi-user environment. Right now, he said, "You can't plug every computer into the same network." But that was something to watch for in the future.

Kildall ended the segment by bringing up the subject of graphics. He said that assuming *TopView* would address the problem of a standardized graphics interface, at least as far as the PC was concerned, what would that mean in terms of the evolving UNIX standard for graphics display? Mashey said at this point it was hard to tell. UNIX was originally designed for fairly slow-speed terminals. That was still its standard interface. UNIX had also become fairly standard in its handling of CRT displays. But work still needed to be done in the graphics standards.

Bill Joy on the Future of BSD and Its “Open Source Code”

Before returning to the studio for the final round table, Wendy Woods presented her second remote feature, this time on Sun Microsystems and one of its co-founders, Bill Joy, who was also behind the Berkeley Software Distribution (BSD) 4.2 version of UNIX. Woods said the success of BSD could be measured by the success of Sun itself, which produced a line of minicomputers and workstations based on the 4.2 release. Woods noted that Sun had grown from 6 to 1,000 employees in just three years. The company currently shipped more than $7 million in equipment each month, primarily to the technology and engineering communities, which found BSD 4.2 the ideal operating environment for their specialized software needs.

Despite this success, however, Woods said Joy wasn’t allowing BSD 4.2 to stagnate. He continued to work closely with his university roots to improve upon UNIX. Joy told Woods that UNIX had hit the point where we were “starting to get standardized by standards committees” and there was an attempt by major corporations like IBM and AT&T to control development. That inevitably meant slowing down the rate of change in the operating system.

Regarding the future of BSD, Woods said its “open source code,” versatility, and ability to work on a variety of machines meant it would remain popular with scientists and engineers for some time. Joy added that UNIX would be important if it could deliver applications that people wanted to run. The technology market needed more operating system capabilities than you were likely to see from the smaller systems. In that sense, Joy said there really wasn’t an alternative application delivery vehicle at the moment.

But would UNIX ever make it big in the business market, Woods asked in narration. She said Joy doubted it. He said what would be needed was a UNIX-based program like *Lotus 1-2-3*–something big and successful. And until that was written, Joy was not super hopeful about UNIX’s future as a business OS.

Why Were There So Many Versions of UNIX?

Back in the studio, Doug Hartman and Mike Denney joined Cheifet and Kildall. Hartman was a UNIX specialist with Hewlett-Packard, which had recently released a new UNIX-based microcomputer, the HP Integral PC. Kildall opened by noting that microcomputer users now expected some form of graphical animated communication with their programs. Hartman said the Integral relied on “Windows menus” to give the user a friendlier UI.

The HP Integral PC, a portable computer featuring a detachable keyboard, a small black-and-amber screen, and a 3.5-inch flopp disk drive attached to the side of the monitor.

Sticking to his main talking point from earlier, Cheifet asked how this made UNIX special, given that non-UNIX computers could do some of this stuff as well. Hartman, also sticking to the talking points, said UNIX offered compatibility with other machines and software portability. He said the idea that you could take programs written on one machine and bring them to another UNIX machine with very little effort made by the software developer's job easier.

Cheifet then asked if his guests could clear up the confusion regarding the different UNIX variants. He listed just a few: BSD 4.2, Xenix, UNIX, HP-UX, PCIX, System III, and System V. "Why are there so many versions of UNIX?," he asked. Denney replied, “Just luck.” Denney, the co-founder of a company called Basis, Inc., explained that the proliferation of names besides UNIX was dictated by AT&T’s requirement that you not call any of the derivatives UNIX. This meant every manufacturer had to come up with their own name. For the most part, however, everything was fairly standard. A Xenix machine looked like UNIX to him. It might have a few extras here and there, but to move even between the BSD and AT&T camps of UNIX showed they were very strikingly the same.

Kildall asked why system programmers felt the need to make local changes? He then managed to answer his own question by citing something that happened at Digital Research. Kildall said he walked into his computer center one night and asked one of the programmers about an I/O statement that wasn’t working right. The programmer then made changes right there and compiled it on the spot. This meant they were now running a different operating system. Denney noted that everyone “improved” the UNIX recipe that they received from grandma–or in this case, Ma Bell–and in particular, computer manufacturers received original UNIX source code and implemented it for different target markets.

Kildall asked about AT&T’s role in all this. Were they trying to bring all of these different versions back into one standard? Denney said it was quite apparent that AT&T would like to define System V SVR 2 (5.2) as the standard. But there was also the competing BSD 4.2 standard. They were actually quite different in terms of the underlying code, although they looked similar to the outside user, with the difference of some utilities. Indeed, Denney said it was quite common for manufacturers to adopt System V but put BSD utilities on top as extensions.

Kildall added that IBM also supported a couple different versions of UNIX. Was this just to fill the market out or were they really getting behind it? After all, IBM and AT&T were competitors. Denney said he wasn’t sure but pointed out that AT&T did use IBM computers in its organization.

Cheifet turned back to Hartman and asked about HP-UX, which was Hewlett-Packard’s implementation of UNIX on the Integral PC. Cheifet noted this was a $5,000 PC. And earlier, Cheifet said Mark Sobell used an AT&T machine priced between $12,000 and $15,000. Did we lose anything in the implementation of UNIX on these lower-cost machines? Hartman said the one thing left out of the Integral was the hard drive, which would allow the user to do their own program development. But by leaving out the hard drive, that allowed HP to reduce cost while leaving the user enough memory to run applications.

Cheifet said he'd read in the trade papers recently that Commodore had plans to come out with a "Mac lookalike" running UNIX. Was that possible? Hartman said the technology was certainly there to do such a machine. It was a question of if the applications were there to support the home user. Kildall remarked that if this rumor were true, Commodore's machine would have to be different than the standard computer they sold at K-Mart.

The main part of the episode then concluded with yet another discussion of the relative advantages of UNIX over other operating systems, which largely reiterated the earlier talking points.

"The Wrong Tool in the Wrong Place"

Paul Schindler's commentary can be summed up by this statement: "UNIX is the wrong tool in the wrong place in the micro world." He argued that UNIX was nothing more than a development environment for minicomputers. But using it on a micro was akin to using a screwdriver to open a can of tomato juice instead of a can opener (which he demonstrated). Schindler largely dismissed UNIX's advantages in terms of software portability, noting that there were "incompatible UNIX dialects galore," and UNIX was ultimately a "user-hostile operating system" that was dramatically short on software.

Summer CES Features Robots, New PCs from Commodore and Atari

Before delving into this episode's "Random Access," a brief note on the timeline. *Computer Chronicles* would rerun episodes on PBS. In fact, I recently learned there were separate episode numbers assigned to the reruns. My theory was that this was likely because they would have to cut or swap out "Random Access" segments for the reruns.

That would appear to be the case with the recording of this episode that was posted to the Internet Archive. Although this episode has a broadcast date in late February, the context clues place this "Random Access" segment sometime in June.

With that clarification, here is the "Random Access" segment presented by Stewart Cheifet:

- The 1985 Summer Consumer Electronics Show (CES) in Chicago recently ended. Cheifet said there were no "blockbuster" new products introduced. But Commodore showed off its new 128 machine, which it promised to ship later in the month. Commodore also displayed its (previously rumored) UNIX machine and two IBM compatibles.
- Cheifet said the hottest new trend at CES was robots. Tomy introduced a new robot that was run by a personal computer. Nintendo also had a game-playing robot that could interface with the game on your computer screen. There were also robots with speech synthesis and facial expression capabilities.
- Atari was a last-minute CES exhibitor, Cheifet said, and it managed to "confuse" the picture surrounding its ST line even more by displaying a 256 KB model that would sell for $499. Atari also unveiled a 500 MB CD storage system that would ship in December and retail for $500.
- A Connecticut design firm released a study of keyboards. Cheifet said the study found that while buyers might want "bells and whistles," they also wanted a simple looking keyboard with contrasting colors on the function keys, full-travel keys, long space bars, and thick edges. (Obviously, this study was not commissioned by Apple.)
- The University of Alabama's Center for Applied Optics said that light beams could soon replace electrons in computers. Optical computers using photons and lasers would be smaller, use less power, and would allow for 3D design and more efficient parallel processing. Cheifet said the Center's research was funded by the U.S. Department of Defense, which considered optical processing essential to the success of its "Star Wars" program.
- Paul Schindler presented his customary software review, this time for *WordMaker*, a searchable database of 100,000 English words used by people trying to complete crossword puzzles. Schindler said the program's command menu was "one of the simplest, most useful I've ever seen." The software was sold only by mail order for $10.
- Cheifet listed the top six selling word processing programs, in order: *Writing Assistant* (IBM), *Word* (Microsoft), *Bank Street Writer* (Broderbund), *PFS:Write*, *MultiMate*, and *WordStar*.
- Bank of America, Chemical Bank, AT&T, and Time announced a joint venture to expand home banking services into broader-based electronic services for home users. Cheifet noted that Chemical and Bank of America currently had nearly 40,000 users for their existing banking services.
- According to a Department of Defense study, only 30 of the Pentagon's 17,000 computers were "adequately protected from unauthorized access."

The Pentagon's head of computer security said most of their computers were "currently vulnerable to any mentally unbalanced 16-year-old."

- Industrial robot sales increased 71 percent in the past year. Cheifet said there were now 15,000 robots working in the United States, up from 10,000 in 1984.
- One final note from CES: Cheifet said lots of the booth space reserved for computer companies went unused–at least until they were grabbed up by producers of X-rated videocassettes.

H-P Managed to Pack UNIX Down Onto a Single ROM Chip

UNIX was a heavy operating system by the microcomputer standards of the time. For example the Commodore 64, the most popular home computer around 1984-1985, had a built-in ROM that contained both the computer's operating system and the BASIC programming language on a single 16 KB chip. In contrast, the HP Integral PC seen in this episode came with a 256 KB ROM that included the HP-UX operating system and the accompanying user interface. Of course, the Integral PC started somewhere around $5,000 while the Commodore 64 could be had for around $150 by early 1985.

And Hewlett-Packard had to put quite a bit of work to make a UNIX operating system fit onto a 256 KB ROM. Keep in mind, UNIX traditionally required a hard drive, as the typical size of a full installation was around 6 MB. As Doug Hartman explained, HP decided to forego the hard drive to keep costs down, so instead the engineers decided to build what they described as a "RAM-based emulation of a disc device" to mount the UNIX root file system.

In a *Hewlett-Packard Journal* article detailing the Integral PC's development, Ray M. Fajardo, Andrew L. Rood, James R. Andrews, and Robert C. Cline claimed they had developed the "first RAM disc for a personal computer to manage its own space" dynamically. This meant unused RAM disc space was not "statically allocated" and could be "periodically freed for use by the rest of the system." The authors claimed this actually made the RAM disc perform better than a hard drive as there was no "time-consuming mechanical head movement."

The authors also decided to eliminate the traditional UNIX practice of storing data in an "intermediate buffer" before writing it to disk, which they said made the file system "extremely susceptible to corruption," especially if the user suddenly removed a disc. For this reason, the Integral PC "immediately posted" all user data to the disc without using any buffer, so that if the user pulled the disc out suddenly it would not damage the file system. The Integral also contained special processes for automatically mounting removable discs, which was not standard UNIX practice at the time.

I don't get the sense that HP managed to sell that many Integral PCs. As one writer, Nick Walker of *Personal Computer World*, noted in his June 1985 review of the Integral, "If a UNIX machine was what you are looking for, then this may well be the cheapest way of obtaining one with the added advantage of portability, although higher-priced UNIX machines will be multi-user and higher performance." Walker added that he was initially skeptical about a ROM-based UNIX system, but he thought HP had managed to create a "machine that makes an awful lot of computer power easy to use."

While the Integral PC might not have been a market blockbuster, the HP-UX derivative of UNIX proved to have significant staying power. Hewlett-Packard Enterprise continues to develop the operating system for servers up until the present day.

The Looming UNIX Wars

Although Bill Joy came from Berkeley, the other co-founders of Sun Microsystems were from Stanford University. ("Sun" was derived from the initials of the "Stanford University Network.") During the 1980s, Sun was known as the place to buy UNIX-based workstations. According to a history published by FundingUniverse, Sun was the "fastest-growing company in the United States" between 1985 and 1989, with a "compound annual growth rate of 145 percent."

As Wendy Woods noted, much of that success was powered by Bill Joy's work on BSD 4.2 and its associated utilities. This ultimately led to a 1987 alliance with AT&T in an attempt to unify the BSD and System V code bases. That, in turn, led to the so-called "UNIX wars." I won't go into detail on this right now, but suffice to say there were other UNIX licensees who were opposed to the AT&T-Sun alliance. These licensees created a new organization, the Open Software Foundation, to promote a competing standard.

To make a very long story short, the UNIX wars led to the creation of new BSD derivatives that did not use any of the copyrighted AT&T UNIX code. These BSD derivatives are still in active use and development today under a number of projects, notably FreeBSD, NetBSD, and OpenBSD.

As for AT&T, it ended development of System V after version 4 and transitioned to a joint venture with Novell to make a new UNIX system called UnixWare. Novell later took over the project on its own before transferring it to the Santa Cruz Operation in the mid-1990s. Meanwhile, Sun continued to develop its own SunOS, re-basing its later releases on System V and renaming the project Solaris. After Oracle acquired Sun Microsystems in 2010, it renamed the operating system Oracle Solaris.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of February 26, 1985, although as noted above the "Random Access" segment is apparently from a rerun of the episode from around June 1985.
- Mark Sobell has continued to work as an author of computer books. In recent years he's shifted his focus from UNIX to Linux. His most recently published text was the Fourth Edition of *A Practical Guide to Linux Commands, Editors, and Shell Programming* (2017), which he co-authored with Matthew Helmke.
- John Mashey started out at Bell Labs in the 1970s where he worked on the early versions of UNIX. He joined Convergent Technologies in 1983 before moving to MIPS Computer Systems in early 1985, just prior to his *Chronicles* appearance. He remained with MIPS for seven years before going to Silicon Graphics as its vice president and chief scientist in 1992. Now semi-retired, Mashey serves as a "consultant for venture capitalists and technology companies," according to the Computer History Museum, where he is also a technical adviser. Mashey has also become well known for his work in debunking climate science deniers.
- Bill Joy remained with Sun Microsystems until 2003. Since then he's been living the life of a venture capitalist, notably promoting investment in green technology.
- I was unable to locate any information regarding our other two in-studio guests this week, Doug Hartman or Michael Denney. Denney worked for a company called Basis, Inc., at the time of his *Chronicles* appearance, which apparently hasn't been in business since the mid-1990s.
- The Amdahl 580 displayed during Stewart Cheifet's cold open was of course produced by Amdahl Corporation. The company's founder, Gene Amdahl,

was a prior *Chronicles* guest. The 580 itself actually referred to a line of mainframe systems priced between $3.6 and $7.1 million.

- The other machine mentioned by Cheifet, the TRS-80 Model 16B, was apparently the best-selling UNIX microcomputer of its time, according to a March 1985 *InfoWorld* article. The 16B, which came with Xenix, had shipped a whopping 40,000 units.
- Wendy Woods' description of BSD 4.2 as "open source" to describe BSD 4.2 may have been one of the first uses of that term in the media. The phrase "open source" did not start to gain widespread acceptance until the 1990s.
- If you're wondering why there was no discussion of *Linux* in this episode, that's because it hadn't been invented yet. Linux is actually not a derivative of System V or BSD. Rather, it was originally designed in the early 1990s as an attempt to clone Minix, which was itself a clone of UNIX.
- On the other hand, when Steve Jobs started NeXT later in 1985, his engineers developed a new operating system called NexTSTEP that was derived from BSD 4.3. After Apple acquired NeXT in 1996, code from NextSTEP and FreeBSD were incorporated into what became Mac OS X (now macOS). So in that sense, Paul Schindler was wrong about UNIX never becoming user-friendly enough to work on microcomputers.
- Nintendo's "game-playing robot" was, of course, the infamous R.O.B. (Robotic Operating Buddy), an accessory used to market the original Nintendo Entertainment System in the United States. Norman Caruso has an excellent documentary on the short life of R.O.B. at his YouTube channel, *Gaming Historian*.
- Commodore never actually released that UNIX computer. There was a prototype known as the Commodore 900 that ran a System V-compatible operating system dubbed "Coherent."

Chapter 8: Steve Boros, Sportspak, CompuTennis CT120, and the Converse Biomechanics Lab

Michael Lewis' 2003 book *Moneyball: The Art of Winning an Unfair Game* described Oakland Athletics general manager Billy Beane's use of advanced statistical analysis–known as sabermetrics–to build his team. The book was later turned into a film, which only further cemented the popular notion that Beane was the key figure in marrying computer-aided statistical research to the 19th century pastoral game.

Beane's tenure as general manager did not begin until 1997. Nearly 15 years earlier, there was another important figure in the Oakland baseball hierarchy who served as a champion for using "computers in the dugout." That was Steve Boros, a former third baseman who served as the A's field manager during 1983 and part of 1984. After Oakland fired Boros mid-season, he joined the San Diego Padres front office and later served as their manager in 1986. During his front office stint in San Diego, Boros was also a guest on a March 1985 *Computer Chronicles* episode, where he discussed the role computers could–and should–play in baseball.

The episode's overall subject was "computers in sports." Stewart Cheifet delivered his cold open from a tennis court. He noted that in tennis, the human brain had to perform thousands of calculations per second to tell the body what to do. But now, tennis players and coaches were turning to computers to discover the secrets to peak performance. Could a computer help you play a better tennis game?

Back in the studio, the computer certainly wasn't helping Cheifet and Kildall as they struggled to keep up with a table tennis-playing robot produced by Sitco Robots. Cheifet said there were about 3,000 of these robots currently in use to train tournament ping pong players. Yet the number crunching of a computer and the finesse of an athlete seemed like totally opposed concepts. Cheifet asked Kildall for more clarification on the role of computers in sports. Kildall replied that sports represented just another vertical market–i.e., another place to sell computer systems for use in analyzing statistics, trends, strategies, and even to help design equipment.

SkyCam Turns Playing Fields into 3D Games

Wendy Woods presented her first remote report, which featured B-roll of footage taken in various stadiums and arenas using SkyCam, a new computer-controlled camera that was “transforming the art of televised sports.” Woods said the SkyCam could glide and dive, shoot straight up in the air, and hover silently within inches from the ground. The system was supported on four thin cables strung across the field, while the camera sat in a dumbbell-shaped cradle equipped with gyroscopic stabilizers and radio-controlled electronics. The SkyCam operator used a joystick to direct the camera’s position almost anywhere on the field–and at speeds of up to 27 miles per hour.

Woods said SkyCam was basically an exercise in geometry, giving the television director precise and instant control over what used to be the most difficult part of shooting a sporting event. Since the positions were defined in the computer, the camera’s moves were choreographed in advance and stored in memory for later replay. And while SkyCam’s uses were not limited to sports, Woods said such events made the best use of the system’s capabilities. A rectangular playing field was easily broken up into X-Y coordinates for positioning the camera. Essentially, Woods said the field became a vast 3D computer game with a range of about 1,000 square feet and several hundred feet high. But unlike the typically flat images of a video game, SkyCam promised an almost infinite variation of depth and angle.

MLB, NFL Coaches Learn to Integrate Computers Into Scouting and Strategy

Joining Cheifet and Kildall on-set for the first of three roundtables this episode was Billy Hicks and the aforementioned Steve Boros. Kildall noted that in the past baseball managers manually gathered game statistics to help decide strategy. But during his tenure in Oakland, Boros automated this process with the help of computers. How did he do that? Boros said that what he tried to do was use the computer to keep track of certain matchups–i.e., Oakland’s hitters versus the opposing team’s pitchers, and vice versa.

Boros cited the example of a May 12, 1983, game between the A’s and the Detroit Tigers. Prior to the game, Boros said he was thinking about moving center fielder Dwayne Murphy down from his “cleanup” spot batting fourth in the lineup, as he had been struggling to hit recently. But after reviewing a computer-generated report, Boros noticed that Murphy had gone 8-for-16 against Detroit starting pitcher Dan Petry. So Boros decided to leave Murphy batting cleanup, and in the fifth inning he hit a grand slam, which helped propel Oakland to an 11-4 victory.

Boros added that now that he was with San Diego as its director of minor league instruction, he would push the club to adopt Oakland’s practice of using computers to keep track of scouting reports on prospects. He said that at the major-league level, he also thought it was a good idea for managers to not only track matchups, but also where in the strike zone a player was likely to strike out or hit a home run, as well as where he would likely hit a ball into the field so as to make it easier to reposition defensive players.

Cheifet asked Boros if he actually used a computer during the game. Boros said he used to look at the computer reports on matchups before the game and take down notes that he would keep in his pocket. But you could not actually have a computer with a monitor in the dugout. This violated Major League Baseball rules, as such a setup could also be used to steal signs from the opposing team’s catcher.

Cheifet asked what management thought about the use of computers in this way. Boros said they were a little bit resistant. He cited Oakland management as a “little more progressive” in this area. He added that there were younger team owners, such as the Atlanta Braves’ Ted Turner and the New York Yankees’ George Steinbrenner, who were embracing computers. But a lot of people in baseball were conservative and resistant to such new ideas.

Cheifet asked if there was ever a situation where Boros’ gun instinct told him to “do it this way” and the computer advised him differently. In such cases, Boros said he always went with his instinct. A manager had to be a master psychologist, he said, and that meant sometimes throwing out the computer data because it was bad psychology and you didn’t want to destroy the confidence of a player.

Cheifet then turned to Hicks, a customer support manager with MDS Qantel, which produced Sportspak, a computer system designed to facilitate statistical analysis in sports. Specifically, Cheifet wanted to know how football coaches used the system. Hicks said Sportspak was primarily used for scouting reports, tendency reporting, and game analysis. For instance, a coach wants to know what the other coach is likely to do in a 3rd-and-2 situation between the 40- and 50-yard lines. What were the tendencies? Would the coach run the ball right or left, or would he call for a pass?

Kildall asked if Sportspak could be used during an actual game. Hicks said no. Like Major League Baseball, the National Football League did not allow computers on the sidelines. You could have computers up in the press box to keep statistics, but that information could not be communicated down to the field. Hicks added that Sportspak was popular enough that opposing NFL teams in the same game often used the system to analyze one another.

Cheifet asked if Sportspak was also used at the college and high school sports levels. Hicks said yes, there were 19 major colleges using the system, mostly for football scouting reports. The system actually had three separate “modules”: sports, tickets, and accounting. This meant Sportspak was also used by the front office and ticket agents as well as coaches and athletic trainers.

Kildall asked about the exact hardware used to implement Sportspak. Hicks said it was a minicomputer manufactured by Qantel. There were three different sizes available and they included up to 128 terminals each.

Turning back to Boros, Cheifet asked if he was using a microcomputer when he worked for the A’s. Boros said yes, he used an Apple II. The Athletics’ director of sports information, Jay Alves, would input information during the game and help prepare the actual reports.

Keeping Track of Tennis Stats Courtside

The second roundtable featured Rich Anderson and Bruce Brown. Anderson, a former junior tennis coach turned computer science teacher, was there to discuss the CompuTennis CT120. Basically, this was tennis-based statistical analysis software that ran on an Epson HX-20 laptop connected to a Compaq Portable. Anderson described the setup as a “computer-age solution to a problem” that tennis coaches had been dealing with for a long time, namely keeping accurate data and statistics during a match. Typically, Anderson said coaches would simply take down notes on a piece of paper. But with CompuTennis, a scorer could take information down directly on the HX-20 and later upload it to the Compaq to perform a more detailed analysis. Since the HX-20 operated off of batteries, it was portable enough to carry onto the court.

Cheifet asked Brown, the scorer for Stanford University's tennis team, to elaborate further on this. Brown said it was impossible to enter all of the shots made during a match, so he would simply input up certain key shots, up to nine for every point. Anderson added that once the data was loaded into the Compaq, the CompuTennis software could prepare a detailed analysis of the match that was useful for scouting an opponent.

Anderson then demonstrated a sample report taken from a December 1984 match in the Davis Cup final between John McEnroe of the United States and Henrik Sundstrom of Sweden. McEnroe lost the match in an upset. Anderson showed a CompuTennis report that explained McEnroe was having a bad serving day and that was a major factor in his defeat.

Kildall asked how the CT120 would actually be used courtside during a match. Brown said the coach could come up and ask for the latest statistics during the match, as the system could be updated to the last point played. The coach could then ask a question like, "Is the opponent making more errors off the forehand or backhand?", and Brown said he could provide an immediate answer.

Computer-Aided Sailboat Design

Shifting gears–or rather, sails–Wendy Woods returned with her second remote feature, this time from North Sails in Berkeley, California. North Sails, a worldwide franchise of sail manufacturers, used an MS-DOS computer to perform what Woods described as the "normally time-consuming job of number crunching" to design the perfect sail for each boat. This computer then transferred those calculations to a second computer, which in turn communicated it to an X-Y plotter that marked and cut the plastic sails.

Larry Herbig, a designer with North Sails, told Woods that it was easy to get hung up on the numbers when making sails. So if you could deal with just the broad concepts and leave the computer to do the number crunching, it made things a lot easier and let him deal with more important things. Woods noted these "important things" included the stretch, shape, and strength of a sail. Those decisions were still made by human designers. The computer was simply there to reduce the labor cost and the tedium–and ultimately, help reduce prices for consumers.

Ultimately, Woods said the success of these computer-designed sails could only be judged in the actual sailing. On that score, Woods noted that North Sails' sails had already won their sailboat owners many prestigious awards, including the 1983 America’s Cup (won by *Australia II*).

Building a Better Athletic Shoe

For the third and final studio roundtable, Jeff Cohen and Rick Bunch joined Cheifet and Kildall. Cohen and Bunch worked for Converse’s Biomechanics Lab. Cheifet asked about the lab’s work. Bunch said it was a general sports research facility that supported the development of athletic shoes. They were interested in how an athlete’s foot interacted with the footwear and how the shoe affected overall athletic performance.

Cheifet asked how computers helped with that goal. Bunch showed Cheifet an instrument that interfaced with a computer to collect data on how the pressure distribution evolved beneath the athlete’s heel and the shoe. The plan was to put the device directly into the heel. He said there were 24 elements (akin to sensors) on this prototype, but they also had a larger 128-element prototype.

Kildall asked if this type of device could eventually make it to the retail level so a customer could find the right kind of shoe. Bunch said it could be easily used for that purpose. More precisely, it would help fine-tune how much cushioning there needed to be in the rear or forward part of the shoe.

Cohen then sat in front of a personal computer hooked up to both a monitor and a small television set. He called up a sample graph taken from a test subject who was outfitted with the 128-element mat. Bunch explained the graph itself showed the measurements of the heel coming into contact with the ground as the subject walked from left to right. Bunch said this data could be used to measure a custom shoe for this particular subject. Alternatively, data taken from a quantity of athletes could be used to build an “average profile” to determine the appropriate amount of cushioning for shoes produced in mass quantity.

Cheifet asked about another device used by the Lab to study what it called *pronation*. Bunch said this measured a person’s rear-foot control. He explained that rear-foot control injuries were the number-one injury experienced by runners. This type of injury accumulated over thousands of miles spent running or training.

Cohen then showed a demo on the television of a person running on a treadmill. He said the computer sampled this video at a 30 Hz frame rate and saved it into memory. Bunch said these stored images were then analyzed to determine the pronation, which he defined as the angle at which the lower leg intersected the heel. He explained that a runner tends to experience rear-foot control problems at angles between 17 and 20 degrees. To correct this, the athlete required a shoe with a maximum level of support. He said a normal range of motion was around 7 to 9 degrees. The athlete in the video had a pronation of 12.9 degrees, indicating the need for a "moderate level of support."

A Luddite Note of Caution

In his closing commentary, Paul Schindler pushed back at the idea of expanding the use of computers in sports. Noting that the San Francisco 49ers and Miami Dolphins both relied upon computer analysis during their recent Super Bowl, Schindler nevertheless "wanted to sound a somewhat Luddite note of caution." He lamented that computers already told us what to do too much of the time. Sports were supposed to be a refuge. And while he understood that professional sports had not been pure for a long time, he still thought we should take a stand of, "Computers out of sports! Athletics for the people!"

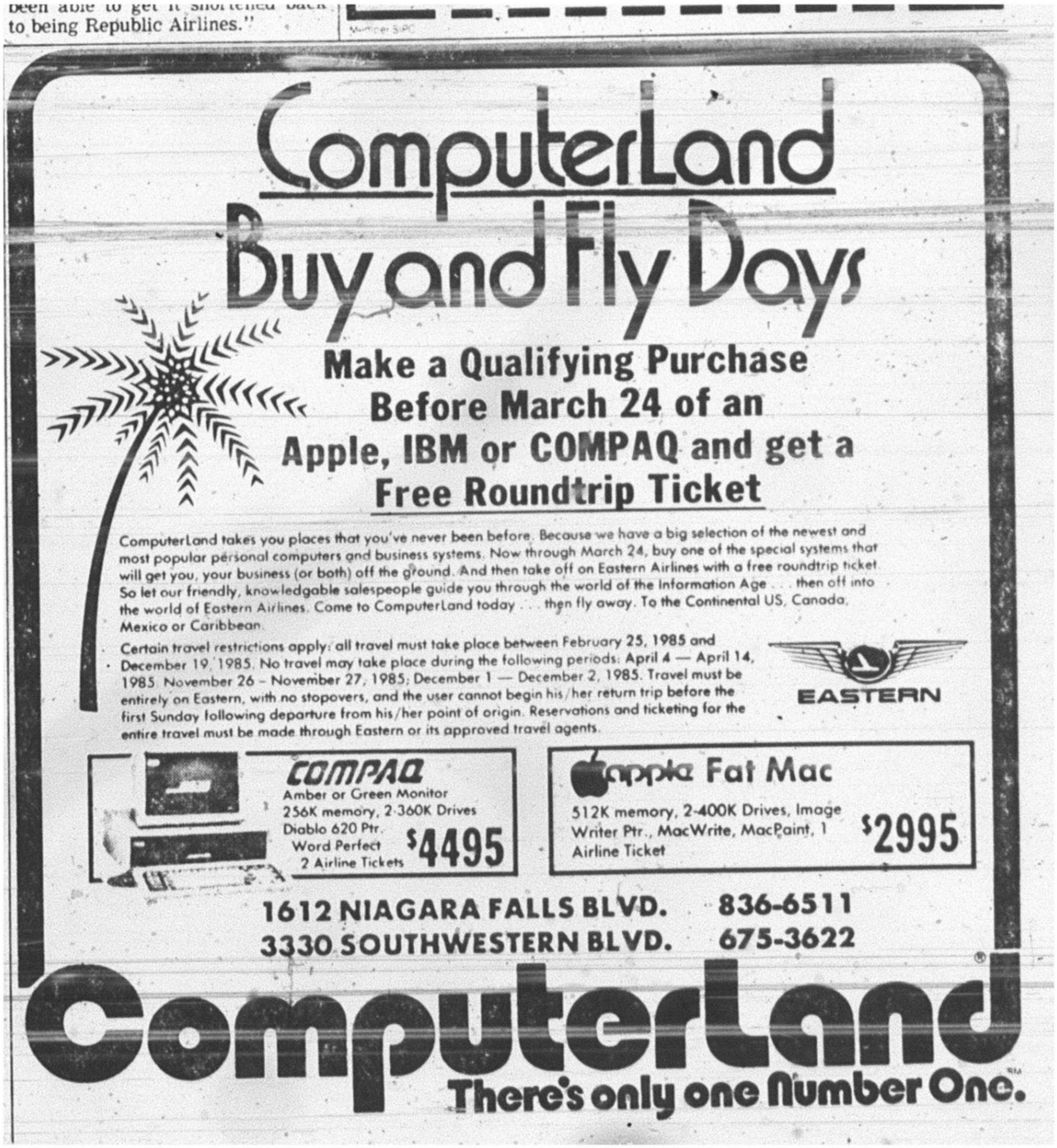
DEC, Convergent Pull the Plug on Failed Personal Computers

Stewart Cheifet presented "Random Access," which is dated around March 1985.

- A high school student in California became the first person charged with "computer trespass" under a new California law. Cheifet said the teenager tried to break into a Stanford University computer that stored the grades for his high school class. His plan was to then charge his classmates $100 to change their grades. But this was thwarted after Stanford alerted local police to the fact someone had made 500 attempts to login to their system using the wrong password.
- IBM said it would soon have its own 1 MB memory chip ready to compete with an expected Japanese chip. Cheifet said the IBM chip would reportedly be twice as fast.
- Digital Equipment Corporation said it would end production of its Rainbow PC line. But DEC said it wasn't giving up on microcomputers; it planned to release a new PC called the MicroVAX II.
- Meanwhile, another failed computer–the Convergent Technologies WorkSlate–was headed for the auction block. Cheifet said the portable

computers, originally introduced at $1,200, would likely fetch just $200 apiece at auction.

- Paul Schindler presented his weekly software review. This week's subject was *ExecuTime*, a $50 calendar program sold by Advanced Productivity Software. Schindler said he bought the program "just because it could handle multiple calendars at the same time," allowing one secretary to schedule three different people.
- VersaTron announced its newest product, the Foot Mouse, which is exactly what it sounds like.
- A new Macintosh program called FileVision offered a visual database that allowed users to store and retrieve data using pictures rather than words or numbers.
- IBM was offering a new $1,000 add-on for the PC called Watson, a combined hardware-software package that functioned as a digitized answering machine with digitized speech.
- A cosmetics company, Elizabeth Arden, was now using a computer–called "Elizabeth"–to help women shop for makeup. The machine captured a still-frame photo of a customer. The operator then applied various cosmetics to the photo electronically. When the customer was satisfied, the operator printed out the image with a list of cosmetics to purchase.
- ComputerLand was now offering a free round-trip on Eastern Airlines with the purchase of a new computer. As Cheifet quipped, "It sure beats *Flight Simulator*."



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A Buffalo News print advertisement from March 1985: "ComputerLand Buy and Fly Dats – Make a Qualifying Purchase Before March 24 of an Apple, IBM or COMPAQ and get a Free Roundtrip Ticket."

Steve Boros (1936 - 2010)

Stephen Boros, Jr., was the oldest of five children born to Hungarian immigrant parents. He played college baseball at the University of Michigan. After being named an All-Big Ten third basemen in 1957, he accepted a $25,000 offer to sign with the Detroit Tigers while he was still in school. (Boros later finished his degree in English.)

Boros went on to play parts of seven Major League seasons with the Tigers, Chicago Cubs, and Cincinnati Reds between 1957 and 1965. Boros transitioned to coaching in the late 1960s, scoring his first managerial assignment with a Kansas City Royals' affiliate in Waterloo, Iowa, in 1970. While serving as first base coach for the Montreal Expos in 1982, Boros received a call from the Oakland Athletics to interview for their vacant manager's job.

Ray Kennedy, writing for *Sports Illustrated* in June 1983, said one of Boros' first questions when he interviewed with Oakland ownership was, "Will I have access to a computer?":

> Boros got the job and the computer and has since been busily poring over all manner of printouts. The results? Well, it's probably no coincidence that the A's have been unexpected contenders in the American League West this year. For one thing, Boros says, the machine has proved an invaluable scouting tool for a rookie manager. "Otherwise," he says, "I'd have had to go around the league at least once to get a line on players. Now I have all the information at my fingertips based on pitch-by-pitch data from the '81 and '82 seasons."

Kennedy noted that Boros was not the only "convert" to the "religion of mathematical probabilities as dictated by the magic machine." White Sox manager Tony LaRussa used a similar system in Chicago. Kennedy also explained that while both managers used an Apple II computer to enter information, the data was later "fed via telephone lines into a mainframe Digital Equipment Corp. computer in Philadelphia." The mainframe then prepared the reports and sent them back to the managers before their next game.

Oakland finished the 1983 season with a 74-88 record, fourth in the American League West. After the 1984 season began with a similarly lackluster 20-24 record, Oakland ownership fired Boros. Jim Leeke, in a biography of Boros for the Society for American Baseball Research, wrote, "Oakland's players were never quite comfortable with their manager." Some of them were apparently also resentful of the role played by the computers. Dwayne Murphy, whom Boros mentioned during his *Chronicles* appearance, reportedly "grumbled" to Boros after being thrown out during a rundown between second and third base that "[t]he computer made me do it."

Boros later joined the San Diego Padres as coordinator of instruction for the team's minor league staff. In 1986, he took over as manager when the incumbent, Dick Williams, failed to show up for the first day of spring training. (Williams told the press he simply didn't want to manage the Padres for another year.) According to Leeke, Boros' 1986 in San Diego was "eerily familiar" to his 1983 in Oakland. Indeed, the Padres finished the year with the same 74-88 record.

After that, Boros returned to his previous role overseeing the Padres' minor league instruction staff. Boros never managed again but continued to work in baseball up until 2004. He spent the final nine years of his career back with the team he started with as a player, the Detroit Tigers, retiring as a special assistant to the general manager.

Boros passed away from complications due to cancer in 2010 at the age of 74.

Anderson a Hall of Famer in Tennis and Teaching

The other coach who appeared in this episode, Rich Anderson, ran the men's tennis program at Cañada College, a community college located in San Mateo County, not far from where *Computer Chronicles* taped. During Anderson's tenure, which lasted from 1971 to 1983, his teams posted a combined record of 142-15, including 11 conference titles and eight California state junior college championships. Anderson himself was an accomplished player in his own college days at San Jose State University, where he reached a No. 17 national ranking and participated in both the U.S. Open and Wimbledon.

In 1983, Anderson accepted an offer from Cañada College to step back from coaching and teach computer science. Anderson went on to spend more than 30 years in the classroom, retiring in 2006. Upon his 2014 induction into the USTA Northern California Tennis Hall of Fame, it was noted that Anderson achieved "the unique distinction of being both an athletic Hall of Famer and earning a Teaching Excellence Award from the California Community Colleges Math Council."

Sports Alone Could Not Save Qantel

As both Billy Hicks and Paul Schindler alluded to, the 1985 Super Bowl between the Miami Dolphins and San Francisco 49ers was also a matchup of two MDS-Qantel customers. Indeed, according to a January 1985 *InfoWorld* article, the teams from the three previous Super Bowls were also Sportspak users.

The company behind Sportspak itself had a rather tumultuous history. Qantel Corporation started in 1969 in Hayward, California. The company's early focus was on producing minicomputers for businesses. In 1981, New Jersey-based Mohawk Data Sciences (MDS) acquired Qantel and kept it running as a standalone division.

During the 1980s, Qantel was apparently Mohawk's best-performing unit. The *New York Times* reported in October 1984 that analysts believed that half of Mohawk's reported $400 million in 1983 revenues could be attributed to Qantel's sales of minicomputers and software. The *Times* noted there were roughly 10,000 Qantel minicomputer systems installed and that "sports applications" were an important factor in Qantel's 20 percent annual growth rate.

In contrast to Qantel, Mohawk as a whole reported a $53 million loss for the 1983 fiscal year, forcing the ouster of the company's chief executive. The October 1984 *Times* report said Mohawk was a tempting takeover candidate based on Qantel's strength alone. Actually, the reverse happened when just a year later, Mohawk sold five of its under-performing units to a private buyer, keeping only its "strongest asset" in Qantel. Mohawk later renamed itself Qantel and sputtered along for a few more years until it filed for bankruptcy in September 1991. Most of Qantel's assets were sold in bankruptcy to Decision Data Computer Corp. and Sussex Investments Ltd. In 1996, a new company called Qantel Technologies acquired some of those assets. That company apparently still exists today.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of March 5, 1985.
- Lawrence L. Cone wrote a detailed article for the October 1985 issue of *Byte* discussing his role in developing the control software for SkyCam, the subject of one of Wendy Woods' features. Cone said he used an Osborne 1 to develop the program over a period of eight months. SkyCam itself debuted during a preseason game between the San Diego Chargers and the San Francisco 49ers.
- CompuTennis was founded by Bill Jacobson, described in a September 1984 *Sports Illustrated* profile as a "former South African amateur who had been applying computer technology to projects involving geophysical exploration." The CT120 was quickly adopted by the tennis community and remained the "industry standard" for statistical analysis until the mid-1990s.

- The other Wendy Woods' subject, North Sails, is still very much in business. The privately held company started in 1957. It introduced the concept of "digital sail design" in 1977. The in-house computer designed process described in Woods' report apparently utilized a Cromemco microcomputer.
- Richard Bunch remained with Converse until 1989. His most recent position was with PerkinElmer, where he served as director of its microfluidics technology division from 2012 to 2016.
- The IBM Watson described in "Random Access" should not be confused with the present-day IBM Watson artificial intelligence system. Both were presumably named for former IBM chief executive Thomas J. Watson, Sr.
- Billy Martin, the manager that Steve Boros replaced in Oakland, was definitely not a fan of computers. He told Ray Kennedy, "I don't need that stuff. I've got it all up here," referring to his head.

Chapter 9: Dollars and Sense, Bank of America’s Homebanking, and Tax Preparer by HowardSoft

The debut of *VisiCalc* in 1979 is often considered the first “killer app” for the personal computer. This early spreadsheet program helped propel sales of the Apple II, as it gave the machine a practical use for business customers. Along similar lines, a number of burgeoning software companies pushed personal finance software in the early 1980s as the next step in expanding personal computers into the home market.

Our next *Computer Chronicles* episode focuses on these personal finance software products. Stewart Cheifet presented his cold open standing in front of a wall filled with various paper tax forms. He noted there were at least 200 different IRS forms that a person might use when preparing their income tax returns–and almost as many personal finance software packages now on the market.

The barrage of tax forms continued into the studio introduction, as Cheifet and Gary Kildall surveyed a mess of paper on their desk. Cheifet said this was how most people handled their personal finances–i.e., sorting through paper check stubs and bills. He added some people believed that personal finance management was what would ultimately drive everyone to buy a personal computer. Kildall said computing in business was born out of necessity–there was just too much data to process. That wasn’t always the case for a home user. He nevertheless agreed that personal finance software could help a person make sound business and tax decisions. But it really came down to whether a person was simply looking for another reason to buy a computer.

IRS Looks to Expand Automation

Wendy Woods presented the first remote segment, which focused on the role that computers played at the IRS itself. She said that in 1984, the agency received 170 million tax returns and collected almost $630 billion in taxes. To help with the monumental task of sorting, checking, and recording all of those returns, the IRS began automating its collection system back in 1964. This automation process–known as “the pipeline”–converted information from paper returns into digital form, either by human transcription or through the use of an optical scanner. While human tax examiners still checked the accuracy of individual returns, the final record of tax information was stored on magnetic tape.

Twenty years after the IRS first adopted this system, Woods said the agency was now undergoing a new phase of automation. The goal was to match documents like a W-2 or 1099 form to individual taxpayers. The new system would also help manage delinquent accounts by telephone, redialing numbers every 15 minutes until someone answered. But this “computerization of the tax collector” did not come easily, Woods added. While the IRS was far ahead of other government agencies back in the 1960s, Congress put a hold on total automation, fearing the spread of “Big Brother”-style information banks. The IRS eventually overcame congressional opposition, however, and now boasted data transfer over dedicated lines and extensive electronic communication between regional offices.

As for the future, Woods said we shouldn’t expect robots to conduct tax audits. But you would see field auditors using portable computers to help them unearth a questionable deduction or calculate the interest owed on unpaid taxes.

Banking from Home Using Your PC

Our first studio roundtable had John Reese and Kevin Randolph joining Cheifet and Kildall. Kildall asked Reese, the president of Monogram Software, Inc., to explain the range of personal finance software now available to consumers. Resse said it was a “broadly attacked marketplace” at the moment with about 40 products on the market. Reese noted his own company’s product, *Dollars and Sense,* was currently the market leader with over 100,000 units sold. But he added there was a wide range of personal finance products available, from simple check register replacements all the way to more richly featured products.

Kildall asked about the features available on these higher-end applications. Reese said in addition to basic recordkeeping activity, top-end applications would also provide things like tax planning, tax preparation, and stock portfolio management. Kildall said such software would be competitive with what was available on a mainframe computer. Reese agreed.

Kildall asked specifically what *Dollars and Sense* offered. Reese said Monogram's product targeted the "upscale household" with more than a small set of financial activities to control. The software provided a complete set of accounts that the user could customize for their needs. Reese then provided a demonstration of *Dollars and Sense* (running on what I believe was a Compaq Portable) to enter sample data, such as checks or credit card transactions.

Kildall pointed out that one of the difficulties people had with personal finance was simply entering data in a consistent and orderly manner. Did Reese find that his customers had such difficulties? Reese said that "top echelon" *Dollars and Sense* users did not have any problems. But to attract the mass audience, it was important to facilitate their ability to enter data.

Kildall then turned to Randolph, a Bank of America (BoA) vice president, and asked about his company's *Homebanking* service. Randolph said the service had been up and running for about a year. It allowed BoA customers to pay bills, transfer funds, perform a balance inquiry, and basically do everything you could do with an ATM (except for paying bills). It was also possible to do electronic mail and lookup bank statements (with a 2-day lag period) from the customer's computer.

Randolph then demonstrated *Homebanking* using Cheifet's account as an example. By navigating a series of menus, Randolph showed how a customer could pick a specific payee for a bill like Pacific Bell or Sears and schedule payments in advance. He added that a payment scheduled for a future date could be canceled up to 3 p.m. on that date.

Cheifet asked how the list of payees worked. Did BoA negotiate deals with each payee? Randolpg explained they actually kept a closed "NP list." This required the customer to provide a list of payees that would like to have on the *Homebanking* service. The bank then checked with both parties to verify account information.

Kildall wanted to know more about the underlying mechanics of *Homebanking*. Was this an electronic funds transfer? Did BoA actually write a paper check to the payee? Randolph said there were four methods of data transmission. BoA used direct data transmission via journals for both the payor and payee. They also sent tapes of transactions to the payee, which were then backed up with paper journals. The bank also used checks and a list of payments. Randolph noted that last month (c. January-February 1985), BoA processed about 48,000 payments, of which about 33,000 were checks.

Kildall said it would be nice if a customer could integrate an online service like *Homebanking* with a software product like *Dollars and Sense*–in effect allowing users to upload and download bank transactions directly to their personal computer. Reese agreed that it sounded like a "very good idea."

Cheifet noted one area of concern: Could someone get into his bank account and spend his money? Randolph said that due to the closed NP list, the worst someone could do was pay Cheifet's bills.

"The Computer Can't Make the Decision Whether Something Is Deductible or Not."

The final segment began with the second studio roundtable. This time, Jim Howard and Jay Levine joined Cheifet and Kildall. Howard's company, HowardSoft, produced a tax preparation application called, imaginatively enough, *Tax Preparer*. Kildall asked for a demonstration. Howard explained that his software automated the entire tax preparation process. When a user received their W-2 or 1099 forms, they simply copied the information into *Tax Preparer*. The program then created the 1040 and any associated forms automatically, which the user could then print out and send to the IRS.

Cheifet asked how much work this would actually save someone. Howard conceded the user still had to type in all of the numbers and collect any receipts. But *Tax Preparer* helped organize your taxes throughout the year. So if a user was disciplined and entered information each month, then by April 15 all they had to do was just push a button.

Kildall noted that software like this competed with professional tax preparation services. So if the software cost more than the service, that would be a problem. Howard agreed that was an issue, adding that many tax preparation services were now themselves getting into the software market.

Kildall then asked about how software like *Tax Preparer* dealt with year-to-year changes in the tax laws. Did Howard have to come up with a new version of the program every year? Howard said they did. HowardSoft offered low-cost updates to their existing users. He said this was typical practice in the tax preparation software market. The annual updates cost about one-quarter of the original program. In the case of *Tax Preparer*, the original package cost $295, with each annual update retailing for $95.

Cheifet then turned to Levine, a manager and professional tax preparer with Price Waterhouse in New York. Cheifet asked Levine what he thought about the use of software like *Tax Preparer*. Levine noted that professional tax preparers had been using computers to prepare returns since the 1960s, typically through an outside service bureau running mainframes or minicomputers. Over the past few years, things had migrated to the microcomputer. Levine added that many of his clients had asked about doing returns on their own personal computer. But because of the "sophistication" of the typical Price Waterhouse client, most of the commercially available software packages could not handle all of their needs. That said, personal finance software was useful in helping clients do much of their own preliminary recordkeeping. The client could then send Price Waterhouse floppy disks with their data, which the accounting firm used to prepare the returns.

Cheifet followed up, asking Levine if any of his clients client had actually said they would use a program like *Tax Preparer* instead of a professional preparer? Levine said none of his clients had said that. Nor did he see that as a real problem for any of the other national accounting firms. But he could see some of the smaller tax preparers facing a problem. At the same time, Levine said the key thing to remember with any program was that the user still had to make a lot of tax decisions on their own. The computer could help organize information–but you had input the right information. Ultimately, he said, “The computer can’t make the decision whether something is deductible or not.”

Kildall noted that one advantage of *Tax Preparer* was the user could change their information and see what the resulting tax would be, similar to a spreadsheet. Howard added that this was basically tax planning that enabled the user to see the year-end effects of their decisions as the year progressed.

Cheifet ended the roundtable by asking Howard about how much tax law *Tax Preparer* actually incorporated. Howard said the program included a number of key tax regulations. For example, if the user tried to deduct more than half of their adjusted gross income, the software would limit that to half.

The Best Software for “Armchair Investors”

Wendy Woods returned for her second report, this time featuring B-roll footage of the Pacific Stock Exchange in San Francisco. Woods interviewed Saul Feldman, a San Francisco-based writer and lecturer who reviewed stock software packages. Feldman found a program called *Stockpak II*–published by Standard & Poor’s (S&P)–to be the best tool for “armchair investors” such as himself.

Woods explained that S&P sent *Stockpak* users new diskettes each month containing performance data for 4,500 stocks. The software then allowed the user to apply selection criteria to help determine the best stock for their needs. Feldman told Woods that *Stockpak* was “doing a lot of the work for me and a lot of work that I could not have done.” He added that 20 years ago, this type of service would not have been possible even with a mainframe computer. The fact he could now do it with an Apple II was “truly amazing.”

Woods noted, however, that using software instead of a stockbroker could have its drawbacks. Feldman said it took a lot of time to do this research even with *Stockpak*. And the software alone was not enough. You still needed to have a good sense of the world around you and what was going on in the market.

Is Electronic Filing in the IRS' Future?

For the third and final roundtable, Ellen Ramsay joined Cheifet, Kildall, and Levine. Ramsay was chief of office automation for the San Francisco bureau of the IRS. Cheifet opened by asking Ramsay for the agency's thoughts on the growing use of software to prepare tax returns. Ramsay said the IRS viewed it positively. She added that one of the greatest mistakes made by taxpayers was a miscalculation on their return. Using a computer could help eliminate some of those mistakes.

Kildall quipped that the software could be perceived as "competitive with the IRS" if it helped users minimize the amount of tax they owed. Ramsay said that if the software helped users calculate their tax more accurately, the IRS still viewed that as a positive.

Kildall asked if the cost of purchasing tax preparation software was itself a deductible expense. Ramsay said a program like *Tax Preparer* was deductible provided that it was developed specifically for preparing taxes. If a person bought a larger forecasting package or spreadsheet, however, that would only be considered deductible if it was used for a business.

Cheifet asked if Ramsay thought people were relying "too much" on software to prepare their tax returns. Ramsay said that was a possibility. People assumed that anything generated by a computer was done correctly. But the computer will not catch your mistakes. If you left out a decimal point while entering a figure, or do not accurately transfer information from a W-2 or 1099, there would still be an error and the computer would not alert the user.

Cheifet moved on to a related topic–namely, what about the possibility of actually *filing* tax returns electronically? Would we ever get to the stage where we could eliminate the paper forms altogether? Ramsay said the IRS was looking into that. The agency was currently running a test program that would allow professional tax preparers to directly input someone's return into the IRS system. The main obstacle to using such a system in the home was the signature–how would a taxpayer actually sign or verify an electronic return?

Cheifet noted that software like *Tax Preparer* generated its own forms. Could a user actually print those forms and send them in? Ramsay said they could if it was an approved form. Several tax software publishers (including HowardSoft) had already obtained such approval.

Cheifet closed the show by asking Price Waterhouse's Levine if there was any software being developed on his end for use with professional clients. Levine reiterated his earlier point that the service bureaus used by major accounting firms had already transitioned to microcomputer-based programs. He added that with the falling prices of laser printers, he expected that Price Waterhouse would soon be able to produce between 20 and 30 percent of their client tax returns in-housing using a laser printer, which could exactly duplicate IRS forms.

"Three Cheers for Personal Finance!"

Paul Schindler's commentary was unusually positive (by his standards). He said that a computer was great for helping with personal finance needs. Schindler noted that his checkbook never balanced properly in the 10 years before he got his personal computer–and it's never failed to balance in the 4 years since.

If the personal computer revolution was to take hold, Schindler said it would be on the back of personal finance software, since they took two of the most painful tasks performed by most households–balancing a checkbook and preparing a tax return–and made them almost fun. So while word processing software may not be useful to anyone who wasn't a writer, everyone could give "three cheers for personal finance" software.

Framework Prevails in Marathon Spreadsheet Competition

Stewart Cheifet presented this episode's "Random Access" segment, which dates the episode around early March 1985.

- Kaypro announced the first-to-market clone of the IBM PC AT. The Kaypro 286i would feature two 1.2-MB floppy disk drives and 512 KB of RAM. Kaypro said it would price the 286i at 20 percent less than the AT and include bundled software from MicroPro such as *WordStar*.
- Data General announced it would sell a new screen for its Data General-One portable computer. The new screen would be tiltable to pick up the "best light" and feature several other improvements. Cheifet said current users could upgrade their screen to the new model for $350.
- European Community officials decided to adopt AT&T's UNIX as their new software standard, which Cheifet said was a blow to IBM's position in Europe.
- Xebec and Western Digital announced a breakthrough in hard disk drive design that could bring prices down by 20 to 60 percent. Cheifet said both companies were working on a 3.5-inch hard disk drive that could be out by summer 1985.
- Atari continued to move towards an April introduction for its new ST computer, which Cheifet said could be a "powerful competitor" to Apple's Macintosh. The Atari ST reportedly had the same graphics capability, menus, icons, and windows as the Macintosh, but also featured color, a hard disk, and a price under $1,000.
- Paul Schindler offered his weekly software review, this time for *The Overhead Express*, which he called the "best program I've ever seen for producing fast yet showy overhead slides." The $195 program from Business and Professional Software of Cambridge, Massachusetts, came with 14 templates and offered the ability to preview slides and produce automated slideshows.
- Ten teams of MBA students from the University of Pennsylvania's Wharton School of Business participated in a "Spreadsheet-a-Thon." Each team used a different spreadsheet program to solve problems. At

the end of the 27-hour marathon, the winning team was the one using *Framework* by Forefront Corporation. (*Lotus 1-2-3* finished in fourth place.)
- The National Science Foundation announced $200 million in grants to put four supercomputers at Cornell, Princeton, the University of Illinois, and the University of California at San Diego, respectively.
- Organizers of the next America's Cup yacht race (scheduled for 1987) have been deluged with applications from challengers. Cheifet said this could make it impossible to hold the traditional round-robin qualifiers with so many teams. As a result, the organizers were considering using a computer simulation for the early rounds to eliminate teams with a low probability of winning. Cheifet noted such a move could save a lot of money, as each America's Cup challenger would likely spend $5 million in a traditional competition.

Dollars and Sense Ended Up Making Little Sense for Parent Company's Investors

Gary Kildall was onto something when he suggested there could be integration between a personal finance program like *Dollars and Sense* and an online service like *Homebanking*. Indeed, several months after this episode aired–October 16, 1985, to be precise–Bank of America and Monogram announced a joint venture called *Moneylink*, which was described in *InfoWorld* as "a communications package that allows banking customers to download bank statements and data into microcomputer-based accounting packages." Monogram's John Reese and Bank of America's Kevin Randolph were both quoted in the article, which makes you wonder if Gary's on-set suggestion helped spur discussions between the two men.

Reese himself had a background in the banking industry. He started his career at Citicorp in the 1970s, where he oversaw the development of early automatic teller machines. In 1982, he left Citicorp to join two former colleagues, Robert Leff and David Wagman, at their new venture, SoftSel Computer Products.

SoftSel was one of the first dedicated computer software distribution companies. Leff had purchased the core of what became SoftSel from On-Line Systems–better known as Sierra Online–in 1980. According to historian Jimmy Maher, Leff paid Sierra co-founder Ken Williams just $1,300 for the distribution business and quickly grew it into a "behemoth that came to dominate the retail software market behind the scenes."

Reese told Kay Saventz of the *Atari Antic* podcast in 2016 that he started out as a consultant for Leff and SoftSel. When Reese suggested the company should move into publishing its own software–specifically computer games–he was offered the chance to make it happen. SoftSel established Monogram Software as a subsidiary with Reese as president. Monogram was effectively one of two SoftSel-owned brands controlled by Reese. While one brand, Tronix, focused on games, Monogram's signature product was *Dollars and Sense*, which was built on Reese's background in banking.

Tronix published a handful of games for the Commodore and Atari 8-bit computer lines between 1982 and 1984. But *Dollars and Sense* made Monogram the more valuable property. As Reese noted during his *Chronicles* segment, *Dollars and Sense* was the top-selling personal finance program of its time–at least before *Quicken* gained popularity.

While you might think that the Bank of America deal would have cemented the market position of *Dollars and Sense*, the product–and Monogram Software–had something of a quick downfall. Reese told Saventz in 2016 that as SoftSel took steps to go public, its venture capital backers were concerned that investors would be "confused" by the presence of these small publishing subsidiaries of what was essentially a distribution company. SoftSel ended up selling Monogram to a "private investor" in 1986. Reese said he didn't see eye-to-eye with the new owner and departed Monogram shortly thereafter.

The investor–who appears to have been a man named John Porter–then turned around and merged Monogram with another privately held company, Star Software Systems, Inc., which published a small business program called *The Accounting Partner*. The deal took effect in March 1987, with the combined firm going under the name Star Monogram Software, Inc. But it apparently didn’t last long. In December 1987, Star Monogram filed its certificate of dissolution with the California Secretary of State.

As for John Reese, he went on to have a long and distinguished post-Monogram career. He worked at TRW from 1990 to 1994, running one of its subsidiaries during that time. In 1994, he founded an early internet startup, iSearch, which focused on job searching and recruiting. He served as iSearch’s CEO until 2001. In 2003, Reese spearheaded another startup, Docufide (later renamed Parchment Inc.), a digital academic credentials service. Reese remained a director with Parchment until its 2020 acquisition by Brentwood Associates.

Bank of America’s Kevin Randolph also went on to work with a notable tech startup, the Interactive Network, which he co-founded in 1987. According to Randolph’s own online bio, Interactive Network “developed and brought to market the first wireless, broadcast, competitive, in-home, play-along interactive television service.” After leaving Interactive Network in 1991, Randolph went on to run a couple of internet service providers during the 1990s. He continued to work in a variety of positions both tech and academia during the 2000s and 2010s, and appears to be a consultant as of this writing.

Notes from the Random Access File

- This episode is available at the Internet Archive and was first broadcast on March 12, 1985.
- Some of the IRS’ 1960s-era software mentioned during Wendy Woods’ segment remained in use for decades after this episode aired. Clint Basinger of the YouTube channel LGR posted a video in 2019 going into detail on this subject.
- Surprisingly, HowardSoft still appears to be in business and actively publishing updated versions of *Tax Preparer*. Howard has been making both tax preparation and real estate analysis software since at least the early 1980s.
- Jay Levine left his position at Price Waterhouse to join rival accounting firm Ernst & Young in 1989. He remained there as a partner for 25 years before retiring in 2013.

- I could not locate any reliable information about our other in-studio guest from this episode, IRS official Ellen Ramsay.
- I (half-jokingly) wonder if the 1987 America’s Cup organizers ended up using *The Official America’s Cup Simulation* for the Commodore 64, published by Electronic Arts in 1986, to run their preliminary trials.

Chapter 10: MacProject, Filevision, GEM, and Lotus Jazz

David Bunnell, a previous guest of *Computer Chronicles*, was well known in the mid-1980s as the publisher of *PC World* and *Macworld* magazines. The latter publication launched a companion trade show, the Macworld Expo, in February 1985, one year after Apple debuted the original Macintosh computer. Macworld went on to be a staple of the tech industry calendar for the next three decades.

One person who did not attend the initial Macworld–held at San Francisco's Brooks Hall–was Apple Chairman (and Macintosh project lead) Steve Jobs. Bunnell, recalling that first Macworld weekend in a 2008 column for the *San Francisco Chronicle*, said Jobs was in town that weekend. Indeed, Jobs attended a dinner with Bunnell, Apple CEO John Sculley, and roughly 20 other people, to celebrate the conference. (Jobs arrived late, of course.)

Bunnell said Sculley, who was "totally jazzed about the Expo," encouraged Jobs to make an appearance the next day. Jobs blew Sculley off. And as Bunnell recounts it, that was likely the beginning of the end of Jobs' initial tenure at Apple:

> Later on, Sculley confided to me and to my partner, Bart Rhoades, that the first Macworld Expo had saved Apple. He complained that Jobs and his team were so burned out from getting the Mac out the door that they had accomplished virtually nothing since. Users were clamoring for more memory, a hard drive, faster boot-up, a color monitor and other enhancements. Macintosh sales had started off with a bang, thanks to the 1984 Super Bowl commercial and to the Mac's ease of use and graphic capabilities, but by 1985, sales had slowed considerably.
>
> Jobs may have been camping out with [his girlfriend] Tina, but the other Apple folks were at the Expo, listening to their customers. When

> they left, they had a renewed sense of urgency. I often wonder, had Jobs bothered to show up at the first Macworld Expo, if he, too, might have regained his focus.
>
> Instead, Jobs got into a power struggle with Sculley. By the end of May, he was sacked as the leader of the Mac division.

Curiously, there was no mention at all of Jobs in our next *Computer Chronicles* episode, which covered this first Macworld and looked at the state of Macintosh software one year into the new platform. Stewart Cheifet did his cold open from Brooks Hall, where he positively proclaimed there were “hundreds of thousands of Macintosh users.” In the studio, he told Gary Kildall that the Macintosh “has certainly been a big success by any measure.”

That said, Cheifet noted the Macintosh didn’t really represent innovation so much as an innovative use of graphics and user interface. Kildall added that the Macintosh interface had its origins in work done ten years earlier. So that wasn’t new. What was new was how the Macintosh offered affordable, hi-resolution graphics. That in turn opened up a new generation of software where pictures and text were equally important.

The “Instant Myth” of the Macintosh

This took us into the first of two remote reports from Macworld. We’re also introduced to a new reporter, Robin Garthwait, who will be featured for the remainder of this season. Garthwait said that in the short history of the personal computer there had never been such a dazzling campaign as the launch of the Macintosh. In less than a year, the Macintosh had been transformed into an “instant myth” that was “bigger than life” and represented a “brash challenger” to its arch-nemesis, IBM.

But Garthwait added that a computer’s success required more than “show business” magic. And the biggest concern was software. When the Macintosh was introduced, there were only two programs available–*MacWrite* and *MacPaint*. Since then, however, the number of Macintosh software products had “skyrocketed” and now numbered in the hundreds, offering everything from word processors to databases to video digitizers. With respect to that last group, Garthwait noted there were now at least three video interfaces available for the Macintosh for transferring live images, still photos, or a direct video feed that could be captured in memory and printed out on a laser printer.

Garthwait briefly mentioned some of the other software products introduced at Macworld, including Hayden Software’s *Ensemble* and *MacPrompter*. On the hardware side, she said there were vendors offering variations on the mouse, such as an oversized trackball for users who tired of the “space-hungry mouse” that came with the computer.

Ultimately, Garthwait said it was hard to say whether the third-party software was going in the business-like direction that Apple seemed to want. She said there were as many games and “fun-oriented” programs on display at Macworld as there were business-oriented applications. But that likely just reflected the versatility of the Macintosh rather than its limitations.

A Database With Pictures

The first of three round tables featured Bob Foster and Joanna Hoffman. Hoffman was the international marketing manager at Apple and a member of the original Macintosh design group. Kildall asked her about the group’s “vision” in terms of what applications would be available for the Macintosh. Hoffman said they knew they were creating the “clay” from which everything else would spring. She cited the history of the Apple II computer, where the company could not have conceived of products like *VisiCalc* running on that machine initially.

Kildall clarified that Apple’s goal was to create a tool and they weren’t sure where that would lead. Hoffman said they knew it would probably lead to the “next generation of software,” but they didn’t know to what extent or how quickly such products would come along. Apple simply hoped to provide a machine that was extremely powerful yet also extremely easy to use.

Hoffman then demonstrated one of the business productivity applications available for the Macintosh, *MacProject*. (I won't walk through this demo in detail. It's project management software. It makes charts.)

Kildall then turned to Bob Foster, vice president of marketing for Telos Software Products, whose company published *Filevision* for the Macintosh. Foster explained that Telos had actually started building this program three years earlier–before they even had a computer that could run it. Foster said that Telos had a background in producing satellite imaging software for mainframes and minicomputers. They wanted to bring similar power to business-level computers.

Kildall explained that *Filevision* was a database product. But while most databases were based on text (and text-based boolean searches), *Filevision* incorporated pictures and graphics into the process. Foster elaborated that the software integrated an object-oriented drawing system with a filing system. Instead of looking at files, you had an object on the screen that was associated with a record, so the data was kept "behind" the object.

Foster then showed a standard demo database that shipped with *Filevision*. It showed a map of the United States. Each state was a separate object. So if you clicked on, say, California, that would link you to the underlying data record for California.

Kildall asked how a user could perform a typical boolean search in *Filevision*. Foster replied they didn't like to "scare" people with that phrase. Instead, *Filevision* had a "Tinker" menu that included an option for "Highlight Some." In the demo, this enabled the user to highlight some of the states on the map based on sorting the underlying data. Here, Foster asked the software to highlight those states with 50 or more computer stores. *Filevision* then redrew the map accordingly.

Kildall asked if there were any provisions included with *Filevision* to help users build new pictures and categorize them. Foster said you could build hundreds of different pictures, and there were third-party developers who sold their own *Filevision* images.

Digital Research Answers the Macintosh with *GEM*

The second round table had Lee Lorenzen and Bennett Wiseman joining Cheifet and Kildall. Kildall asked Wiseman, a computer industry analyst, to discuss potential resistance from the business market towards the Macintosh. Wiseman said the Macintosh was built to emphasize the ease of use and installation, and there were some limitations put on the computer to accomplish that. The question was whether the ease of use would get the Macintosh into the office, or whether its limitations would prevent adoption.

Kildall asked for clarification about the Macintosh's limitations. Wiseman said the main concern was the Macintosh's ability to interface with networks and other products. Apple was aware that this was an issue but had yet to deliver a solution. And business users–particularly larger enterprises–needed to see more "hard product" and be convinced that Apple would provide them with the kind of support and connection capability they demanded. Smaller businesses may not be as concerned about these items and would instead focus on the Macintosh's immediate usefulness. But these smaller firms would not have concerns, for instance, about how to link a Macintosh to an IBM mainframe.

Cheifet pointed out that Wiseman had advised his own clients that if Apple wanted to be successful in the office the company had to "tone down their hype." What did he mean by that? Wiseman said that unlike home users, business users tended to be extremely conservative. A lot of things that were attractive about the Macintosh to home users worked against a lot of the basic policies of office systems. Business customers didn't like openness, lack of control, and the proliferation of software and products that represented the "fundamental theology" of the Macintosh. So while the advertising made business users uncomfortable about these things, a company like IBM would continue to do everything possible to make them feel as supported and loved as possible.

We then take a bit of a hard-left turn as Kildall asked Lorenzen, one of his employees at Digital Research, to talk about their new software offering, *GEM*. Kildall explained that *GEM* was a product for the IBM PC that effectively provided a Mac-like user interface. Lorenzen demonstrated *GEM* and one of its associated applications, *GEM Draw*, on the new IBM PC AT. Unlike the Macintosh, *GEM* provided a color interface. Cheifet asked if a user needed an AT to run *GEM*. Lorenzen said it would run on the original IBM PC and even the IBM PCjr. But the machine required at least 256 KB of memory, and to support color effectively you would need something like an AT or the Tandy 2000.

Lotus Hopes to Replicate *1-2-3* Success with *Jazz*

Robin Garthwait returned with her second report from Macworld, this time focusing on Lotus' new Macintosh-based office software suite, *Lotus Jazz*. Eric Bedell, a product manager with Lotus, told Garthwait that the company had taken the lessons of its existing successful products, *Lotus 1-2-3* and *Lotus Symphony*, and re-designed a new concept for the Macintosh. He emphasized that Lotus started from scratch with *Jazz* and did not simply "carry over" the functions of those earlier programs.

Garthwait explained that like *1-2-3* and *Symphony*, *Jazz* permitted users to keep several files active simultaneously. Database, memo sheets, word processing, and communications worked together interactively and made extensive use of the Macintosh's icons and hidden menus.

Garthwait noted that Apple's determination to make the Macintosh a success led to some unusual partnerships during the development process. While most new machines tried to fit themselves to existing software, Apple courted major software producers like Lotus ahead of time. Bedell said that Apple approached Lotus in July 1983 to show them the prototype of the Macintosh upfront so the company could make a decision to develop for it ahead of the January 1984 launch. Garthwait added that Apple made similar efforts to anticipate their users' needs for new hardware as well–specifically its LaserWriter laser printer. Apple was betting that the LaserWriter's speed–8 pages per minute–combined with the Macintosh's lively graphics would finally give the company the image it sought as a serious business tool.

Macintosh’s Xerox Roots

For the third and final round table, Larry Tesler joined Cheifet, Kildall, and Wiseman. Tesler previously worked at Xerox PARC on many of the technologies that were later incorporated into the Macintosh user interface. Tesler now worked for Apple’s Future Architecture Group.

Kildall noted that Tesler and others at Xerox PARC in the early 1970 had a vision of what computers would like in the 1980s, and that vision appeared to be “right on.” So what steps led from Xerox to the Macintosh? Tesler said it really began with Doug Engelbart and his team at SRI International, which developed the concept of “office automation” back in the 1960s with ideas like the mouse-driven computer interface. Some of those same SRI people later joined PARC. They believed something like the Macintosh would be possible by 1980 provided that hardware costs fell enough to make it practical. Tesler noted that systems with hi-resolution graphics could run upwards of $100,000 in the 1970s. But the PARC vision was for workstations that included not only hi-resolution graphics, but also a mouse-based interface, networks tying the machines together, and laser printers. This was essentially the Macintosh, albeit five years past their “optimistic” 1980 goal.

Kildall asked about the relationship between the earlier work at Xerox PARC and what Apple did later with the Lisa and then the Macintosh. Tesler pointed to his group’s work on Smalltalk, an object-oriented programming language developed for educational use in 1972. He also said he spent some time at Xerox developing systems for business users. But around 1980, it became clear that Xerox intended to focus its attention entirely on high-end workstations like the Xerox Star. Tesler said his interests tended more towards personal computers, so he and a few others left Xerox to join Apple and continue developing Smalltalk there.

As an aside, Kildall asked Wiseman if he thought the Xerox Star remained a viable product. Wiseman said it was still “very much alive” and had already seen five major software revisions. The system’s performance had improved substantially, but it remained very much a business system.

Kildall concluded by asking about the future. What would we see over the next 10 years? Tesler said there would be some improvements in visual presentation and pointing devices. But he thought the main change would be in the area of communications–specifically, the ability to download information from corporate databases to the personal computer and usefully processed. The new goal was to have people prepare routine work to have it done by the machine and to have an “agent” in the machine representing them in transactions with other individuals.

An Over-Advertised, Shiny Box

Paul Schindler’s closing commentary was far less optimistic about the Macintosh and its future as a business machine. He compared the Macintosh to another famous “Mac”–McDonald’s Big Mac–and said they were “both over-advertised, shiny boxes whose contents disappoint.” Schindler simply wasn’t convinced that the Macintosh would ever be taken seriously in the office. He noted the machine itself was wonderful but flawed–it was too expensive, not fast enough, and was still limited to black-and-white graphics. And while many touted the hi-resolution graphics, Schindler said it was overkill for words and data. So while he was eager for Apple to succeed in breaking IBM’s “hegemony” over the personal computer market, he didn’t see Macintosh as the answer.

TopView Finally Arrives!

Stewart Cheifet presented “Random Access,” which dated the episode in March 1985.

- AT&T was reportedly ready to release its new UNIX-based computer, the PC 7300. The multi-user machine will handle between 4 and 9 users and can be configured with between 512 KB and 2 MB of memory, along with an icon-driven interface, a mouse, and a built-in telephone.
- There were rumors that IBM was now working on the “PC-2,” a lower cost version of the PC AT, which would replace both the original IBM PC and the XT. The PC-2 would reportedly cost around $1,000.

- Commodore showed off its new laptop portable, which featured a 16-line, 80-column display; a built-in modem; business software included in ROM; and 32 KB of memory. Cheifet said Commodore expected to sell the machine for under $600.
- Meanwhile, Atari released additional details about its forthcoming 130ST computer. The $400 machine would come with 128 KB of memory and Digital Research's *GEM*. Atari also planned to offer a 10 MB hard disk drive peripheral for $600.
- Paul Schindler reviewed the long-awaited IBM *TopView* graphical operating system. Schindler said it was "easy to use but hard to install," especially if you wanted to run non-IBM software through the *TopView* graphical interface. Schindler also cautioned that IBM's minimum system requirements were too low. He said you would need at least 512 KB of memory, a hard disk drive, and a mouse.
- The IRS "fouled up again," in Cheifet's words, as millions of tax returns were delayed due to problems with the agency's new $100 million computer system.
- ComputerLand cut the costs of its computer store franchises from $75,000 to $15,000 "or less."
- Oberon International introduced the Omni-Reader, a new low-cost scanner. The machine, which cost less than $500, could scan text and save it as a file on a personal computer.
- Lotus Software announced the launch of its new *Lotus* magazine, which would provide monthly coverage of its products. Lotus said the initial circulation would be 300,000 copies.
- Cheifet said that Palm Beach County, Florida, was now using computerized radio transmitters strapped to ankle bracelets to help keep track of people out on bail.
- Servers at the McArthur Park restaurant in Palo Alto, California, were now using palm-sized computer terminals made by Validec, Inc., to enter orders, which were then transmitted to printers in the kitchen. Cheifet joked, "I think I'll tip via *Homebanking*."

Apple Forced DRI to Make Changes to *GEM*

Much of the discussion in this episode focused on how Apple implemented a user interface on the Macintosh that was largely conceived of and developed at Xerox PARC. While Apple management was happy to borrow from others, they were not so charitable when it came to others borrowing from the same sources. To the contrary, Apple eagerly used the legal system to try and stop others from implementing their own mouse-driven GUIs.

This included *GEM*. Apple sued Digital Research not long after Lee Lorenzen demonstrated the first version of *GEM* on *Chronicles*. Apple claimed DRI violated its copyrights on the Macintosh user interface. Gary Kildall apparently wasn't eager to fight, so DRI quickly settled. According to an October 1, 1985, report in the *New York Times*, *GEM* "would be altered to make them less similar in operation and appearance to Apple's programs that run on Mcintosh." Apple reserved the right to approve any modifications and DRI would "pay Apple an undisclosed amount and to work on Apple software development."

Thom Holwerda, writing about the settlement in 2012 for OSnews, noted the changes demanded by Apple were mostly cosmetic. For the subsequent *GEM/2* release, the "trash icon was altered, the desktop was replaced by two permanently open, fixed file manager windows, scrollbar blobs were made narrower, and animations were removed from the system." As Holwerda noted, the real goal wasn't to protect Apple's legitimate intellectual property rights, but rather to prevent the spread of graphical user interfaces to IBM and IBM-compatible machines.

Holwerda also pointed out the "irony" of Apple suing Digital Research for "stealing" its user interface when it was DRI's Lorenzen who "worked at Xerox PARC on the very same user interfaces upon which the Macintosh was built." In other words, it was Apple who partially copied Lorenzen's work, not the other way around.

Lotus Jazz Failed to Sing with Mac Customers

While the Macintosh's user interface proved to be a hit, the same could not be said for one of the Mac applications featured in this episode, *Lotus Jazz*. By all accounts, the product was a massive failure. According to tech journalist John C. Dvorak, Lotus only sold around 20,000 copies of *Jazz*. In contrast, Microsoft sold about 200,000 copies of its new spreadsheet program Excel during its initial run. Lotus continued to support and upgrade the product–renaming it *Modern Jazz* in 1988–before switching gears and trying to port *Lotus 1-2-3* to Macintosh instead.

Mitch Kapor, the co-founder of Lotus, told CNET's Dan Farber in 2014 that *Jazz* took too long to develop–it was released more than a year after the Macintosh launched–and the final product was "overly ambitious, and it had bugs in it." Kapor also criticized his own decision-making in spending millions of dollars to advertise *Jazz* on television, which he said "was just like setting fire to bales of hundred-dollar bills." More broadly, Kapor said, ". The Mac in 1985 and the enterprise [market] was a complete nonstarter."

John C. Dvorak cited a number of other factors in *Jazz*'s failure: It was priced too high for "penny-pinching early Mac users" at $595, the copy protection prevented users from making backups, and the software could only import and export files to be read by other users of *Jazz*. Dvorak also echoed Kapor's critique of the television ads, which he called "dopey" and "ill-conceived."

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of March 19, 1985.
- Although Macworld is most commonly associated with San Francisco's Moscone Center, the early expos were held at Brooks Hall, the city's original convention center. Named after San Francisco's former chief administrator, Thomas A. Brooks, Brooks Hall also hosted Doug Englebart's famous "Mother of All Demos," which Larry Tesler referenced during his *Chronicles* appearance.
- Telos Software released an expanded version of *Filevision* called *Business Filevision* in September 1985. I couldn't find much else about Telos Software past 1987. Telos Software itself existed as a California corporation from 1983 to 2002.
- Joanna Hoffman was one of the original members of the team that developed the Macintosh. She later joined Steve Jobs at NeXT, Inc., which he founded a few months after this episode aired. After NeXT, Hoffman joined an Apple spinoff company called General Magic,

where she served as vice president of marketing. Hoffman retired from the industry in 1995.

- Hoffman was widely considered Jobs' "right-hand woman" at Apple and NeXT, so much so that she was actually a featured character in the fictional 2015 biographical film *Steve Jobs*. Kate Winslet played Hoffman.
- Hoffman also had a reputation for standing up to Jobs' bullying and narcissism. Luke Dormhel noted in a July 2021 article celebrating Hoffman's 66th birthday that she once "threatened to pour hot coffee over Jobs' lap when he became irate over the lack of vegan food in a restaurant." (Just imagine how livid Jobs must have been at Paul Schindler comparing his Mac to the Big Mac!)
- Larry Tesler (1945 - 2020) passed away in February 2020 at the age of 74. As noted in a *New York Times* obituary, it was Tesler who first introduced Steve Jobs to the Smalltalk system "that would come to influence the design of Apple's Lisa personal computer and then its Macintosh." Tesler remained at Apple until 1997 and later worked for Amazon and Yahoo.
- Lee Lorenzen only remained at Digital Research until November 1985, when he left to co-found Ventura Software with two other DRI employees. The new company released *Ventura Publisher* in 1986, a desktop publishing package for *GEM*-based systems. Lorenzen and his partners later sold the *Publisher* source code to Xerox. Since the 1990s, Lorenzen has been involved as a founder or financial backer for about 30 different startups, including WorldShop and Altura Ventures, where he continues to serve as CEO of both.
- I was unable to locate any information about our other in-studio guest, Bennett Wiseman.
- The rumored IBM PC-2 eventually became the IBM Personal System/2 (or PS/2), which debuted in 1987.
- The Commodore portable machine–known as the Commodore LCD–never made it to market. Management decided to kill the project in order to focus on the Commodore 128, which will be featured in an upcoming *Computer Chronicles* episode.

Chapter 11: TopView and Concurrent PC DOS

One late night in the summer of 1972, an electrical engineering graduate student at the University of Washington named Tom Rolander was working in the school's computer science lab when he saw a "fellow who looked like a student" sporting red hair and wearing cutoffs enter the room. The red-haired man pulled out a teletype, plugged it into a Sigma 5 computer, and started programming an Intel 4004–the very first commercially produced microprocessor, which had been released the previous November.

Rolander said he was so "enamored" by what the red-haired man was doing that he went up and introduced himself. The red-haired man said his name was Gary Kildall. Intel had actually hired Kildall, then working at the Naval Postgraduate School in Monterey, California, to build a monitor–essentially a basic form of computer firmware–for the 4004.

The PC-DOS Affair

This turned out to be the start of a long relationship between Kildall and Rolander, who was a guest on our next *Computer Chronicles* episode. Normally I would recap the episode before delving into a guest's background, but in this case I think it's useful to tell a bit more of Rolander's story, as it provides some important context for the program's subject, which is IBM and the state of its software ecosystem in 1985. (The following is summarized from an extensive interview that Rolander gave to the Computer History Museum in 2016.)

After Rolander completed his master's degree in 1975, he initially went to work for Fluke Corporation, which produced industrial testing equipment, before later taking a job at Intel. While at Intel, Kildall offered Rolander a job working in software development. After the two men spent a day bonding over their love of flying–Kildall and Rolander were both licensed pilots–Rolander became one of the first Digital Research employees working out of the company's headquarters, a Victorian-style house in Pacific Grove, California.

Rolander briefly relocated to Washington, DC, then Florida, at the insistence of his wife. She eventually left him–Rolander's account seems to suggest she joined a cult–and he and his children then moved to Pacific Grove. By this point, Rolander was DRI's vice president of engineering. Rolander's main project was working on a multi-tasking operating system to succeed CP/M.

During this period–around the end of 1980–IBM decided it was going to produce what became the IBM PC. Obviously, the machine needed an operating system. As Rolander noted, most computers at the time used a combination of CP/M as the operating system with Microsoft BASIC as the built-in programming language. Rolander said IBM initially approached Microsoft, apparently unaware that it did not actually own CP/M, to make a deal. Microsoft Chairman Bill Gates then contacted Kildall to let him know that he had a potential customer for CP/M.

What happened next is a fairly well-known story, although the details are often disputed or misconstrued. Again, this is taken from Rolander's account of events. Kildall scheduled an afternoon meeting with IBM at the house in Pacific Grove. Kildall and Rolander had a morning meeting in Oakland–as it turned out with another guest from this *Chronicles* episode, Bill Godbout–and they planned to fly back to Monterey immediately after. The IBM representatives arrived early, however, so they met with the other DRI employees at the house, including Gary's wife Dorothy Kildall, who was the business manager.

IBM insisted that DRI sign a one-way nondisclosure agreement–basically, DRI couldn't reveal anything that IBM told them about the PC, but anything DRI told IBM about CP/M would become public domain. Dorothy Kildall understandably balked at those terms. But when Gary Kildall eventually arrived, he was apparently okay with the NDA and signed it.

What Kildall was not okay with, Rolander said, was IBM's proposed licensing terms. IBM demanded a "fully paid up license" upfront and the right to re-brand CP/M as “PC-DOS” on its machines. This went against DRI’s normal terms, which insisted that “everybody had to call it CP/M” and pay royalties based on the number of copies that the computer manufacturer actually installed. Kildall was concerned that accepting IBM’s terms would force him to make similar concessions to other customers. So the meeting ended “amicably,” in Rolander’s words, and IBM walked away without a CP/M license.

About a month later, Rolander said he heard through the grapevine that their friend Bill Gates had acquired the rights to an operating system called QDOS, which was produced by a company called Seattle Computer Products. Microsoft planned to re-license QDOS to IBM as PC-DOS. When Kildall heard about this, he threatened to sue IBM, as he believed that QDOS was nothing more than an illegal copy of CP/M.

Rolander said this led to another meeting with IBM in an attempt to diffuse the situation. IBM told Kildall and Rolander that it would not bundle any operating system with the PC and instead said that customers could choose either CP/M or PC-DOS. IBM agreed to purchase approximately 100,000 CP/M licenses and even hired Rolander’s engineering team to write the BIOS for the PC. In exchange, DRI agreed not to sue either IBM or Microsoft for copyright infringement.

Of course, IBM pulled a bait-and-switch. While it did technically offer customers their choice of operating systems, anyone who wanted CP/M would pay about $200 more than if they went with IBM’s preferred choice, PC-DOS. Rolander said he and Kildall had incorrectly assumed they’d be on “a level playing field” with Microsoft. But that was that, and the rest was history.

Was IBM’s Dominance Good for the Industry (and Customers)?

Fast forward to 1985 and now IBM had a problem on its hands. The IBM PC with PC-DOS had proven successful–so much so that Big Blue now wanted to assert greater control over the software side. Microsoft’s PC-DOS licensing deal was not exclusive, so Gates’ company could (and did) license essentially the same software to other computer manufacturers under the name MS-DOS.

IBM’s plan was to introduce a multi-tasking, windowed operating system called *TopView*. This product has been mentioned in prior episodes covered on this blog. Indeed, the previous episode featured a brief Paul Schindler review of *TopView*. But this episode marked the first on-air demonstration of the project–not by IBM, who declined to allow any of its employees to appear, but by Tom Rolander, who was also there to show off DRI’s own multi-tasking operating system, *Concurrent PC DOS*.

The episode began with Stewart Cheifet doing his cold open in front of an unidentified IBM office building (presumably somewhere in Silicon Valley). Cheifet noted that IBM was currently the number-one company in the world in terms of after-tax profits, its annual gross sales of $46 billion was bigger than the State of California’s budget, and of course it manufactured the computer that a businessperson was most likely to buy.

In the studio, Cheifet said IBM’s dominance was so great that it effectively took over the phrase “PC.” Was this kind of domination good or bad for the industry and the customer? Gary Kildall replied that IBM came into the industry at a time when it was struggling with hardware standards. IBM set those standards and, in doing so, put a lot of companies out of business. The remaining companies had to sharpen their pencils and make sure they offered competitive products to maintain a position to deal with IBM’s influence.

“Secretively, Cautiously, and with Ruthless Efficiency”

Robin Garthwait was back this week and she provided some brief narration over a montage of various IBM promotional films. Garthwait said that in many respects, the history of IBM was the history of computing. The founder of IBM’s parent company, Herman Hollerith, had devised the first practical card-punch calculator, which was used for the first time to tabulate the 1890 United States census. The IBM punch card soon became the symbol of the early computer age.

Garthwait said that IBM’s first mainframe computer, the Mark I, ushered in the post-war era of data processing. Initially this power was mostly restricted to scientific applications. But IBM’s primary market was always business–especially big business. As advances in memory and storage took place, Garthwait said they were applied and promoted for business use. In this manner, the computer developed an almost exclusive hold on the data processing departments of major corporations.

By the 1960s, Garthwait said, IBM was the leader both technically and commercially with over two-thirds of the mainframe market. IBM’s pervasive customer support and computer families gave it a major advantage in almost every aspect of business computing. By 1966, IBM began to look at the small business market as well and started expanding overseas.

Now that IBM was free of a lengthy federal antitrust lawsuit brought by the U.S. government, Garthwait said IBM continued to expand its share of the market. And it was doing so in the same way it had in the past–“secretively, cautiously, and with ruthless efficiency.” ## Was IBM Playing It Safe?

For the first round table, the aforementioned Tom Rolander joined Cheifet and Kildall, along with Norm DeWitt, a PC industry analyst with DataQuest. Kildall opened the discussion by asking if there was any effective competition now for IBM in the personal computer market, or would everyone be working towards IBM compatibility. DeWitt said that in 1984, IBM captured 26 percent of the worldwide personal computer market. DataQuest expected that share to increase to between 40 and 50 percent by 1989. But he added there were opportunities for others in the market. He noted there was strong competition from Apple, Compaq, and several Japanese computer manufacturers. DataQuest also expected AT&T to make a move within the next two years.

Kildall pressed on what AT&T would do. DeWitt said that AT&T entered the personal computer market back in June 1984. In the last six months, the company had to establish its channels of distribution. DeWitt said AT&T had done a good job in that area, as there were now about 900 retailers signed up. But if AT&T’s objective was simply to bring another IBM-compatible machine to market, AT&T wouldn’t have bothered. AT&T’s real strength was its ability to bring communications to the PC market and he expected AT&T would release products later in 1985 to take advantage of that.

Kildall clarified that AT&T's approach would therefore be to focus on the higher end of the market such as the office environment. DeWitt agreed, noting that based on DataQuest's research, about 68 percent of the market potential was for the business office market.

Kildall then pointed to the IBM PC/AT on the table and asked Rolander about IBM's new operating system, *TopView*. Kildall said the AT was an example of a high-end machine that was effectively a competitor for minicomputers. Rolander said that IBM saw the need for an operating system with multi-tasking, windowing, and data interchange capabilities. As IBM moved from the original PC to the later XT and AT models, there was now quite a bit of power available and a single-thread, single-tasking operating system was no longer sufficient.

Rolander then provided a brief demonstration of *TopView*. He explained that while *TopView* could open multiple applications simultaneously, if it would suspend operation of any non-selected application that was not "well behaved." In other words, if the program was not specifically designed to run with *TopView*, it would not continue executing while in the background. Kildall said this meant that certain applications such as *WordStar* would need to be modified to take advantage of multi-tasking in *TopView*. Rolander said that many independent software vendors were interested in pairing well-behaved applications with *TopView* to take advantage of all of its features, including cut-and-paste between programs.

Kildall pointed out that unlike the Macintosh operating system, which featured a graphical user interface, *TopView* relied entirely on text characters to create its windows. Would the lack of graphics be a detriment to *TopView* adoption? DeWitt said he wasn't sure about that, noting that IBM could still add graphics capability in the future. Still, Kildall persisted, asking if *TopView* wasn't a case of IBM playing it too safe. DeWitt said he thought this was a very strategic product and that you would see *TopView* around for many years to come.

Cheifet interjected, pointing out that there had been some criticism of *TopView*. What were those criticisms? Rolander reiterated the impact on independent software vendors who were reluctant to rewrite their applications to work with *TopView*. After all, as soon as you wrote a *TopView*-specific application, that meant the end user had to have an IBM PC and purchase *TopView* separately just to run the program. That immediately shrunk the potential customer base. Kildall added that *TopView* also required a lot of memory, so the user basically needed to buy the new AT.

Cheifet asked DeWitt to elaborate on his earlier statement that *TopView* was an "important strategic product" for IBM. Did this mean the negatives weren't that important? DeWitt said he thought IBM would put its resources behind both marketing and development of *TopView* and that the product would continue to evolve over time. Kildall said this also represented IBM's attempt to bring software development in house. DeWitt agreed, noting that IBM had publicly stated it planned to capture "significant market share" in software moving forward. ## Giving a Personal Computer the Abilities of a Minicomputer Tom Rolander stayed for the second round table with Cheifet, Kildall, and Stuart Alsop II joining the group. Alsop, the former editor of *InfoWorld*, now published his own PC industry newsletter. Continuing with a thread from the previous segment, Kildall asked if we were now seeing IBM attempting a takeover in software. Alsop said that was part of their announced strategy, but recent reports indicated their software wasn't selling. Software was what provided value to the user, and if it didn't provide that value, the user wouldn't buy it.

Kildall asked why customers weren't buying. Alsop said IBM's offerings weren't competitive with what the independent software vendors such as Lotus already had on the market. IBM's products were not as good feature-wise, not as easy to use, and not as powerful.

Cheifet then shifted the discussion to Digital Research's latest software offering, *Concurrent PC DOS*, which like *TopView* provided a multi-tasking operating environment. Kildall said DRI had been interested in multi-tasking for a long, long time, and Rolander had done quite a bit of work in this area. Now that IBM had released *TopView*, there was also a lot of interest in *Concurrent*.

Rolander then demonstrated *Concurrent* running on the IBM PC AT. He explained that it was a DOS-compatible operating system that could run multiple applications–four in this case–simultaneously. Unlike *TopView*, a program like *WordStar* could run in the background. Effectively, Kildall said, it was like running four different computer systems at once. This represented another level for small computer users, especially those working in networked offices.

Cheifet asked Alsop about the use of multi-tasking operating systems from the customer's point of view. Alsop said the problem with *TopView* and similar operating systems–he wasn't certain about *Concurrent*–was that they required a lot of effort on the part of the user to share applications. There was also the financial burden of spending additional money on the operating system and updating your machine. The program itself had no specific value. It merely integrated other programs. Kildall interjected, stating the value was that multi-tasking gave the personal computer the capabilities of a minicomputer. Alsop agreed, adding that the AT was basically the first minicomputer disguised as a personal computer.

The Risks of Being an IBM Supplier

Robin Garthwait returned with a brief remote segment. She interviewed Bill Godbout, a former IBM employee and long-time veteran of the computer industry, about the relationship between Big Blue and its suppliers. Godbout said there were a number of cases where a supplier got itself into trouble through a mixture of avarice and laziness. When a single customer–i.e., IBM–walks in and says it will buy everything you make for the next three years, it was real easy to sit back and say you've got it made. But if IBM found the supplier's product unsuitable for any reason–and it may be a fine product–then the burden was on the supplier to be flexible. Garthwait added that the decision to either compete against IBM or become one of its suppliers would always carry risks.

IBM Still Didn't Control the "Whole Situation"

For our third and final roundtable, venture capitalist John Doerr joined Cheifet, Kildall, and Alsop. Doerr’s firm, Kleiner Perkins, previously backed a number of successful computer companies including Compaq and Lotus. Cheifet asked if IBM’s dominance had made it more difficult for venture capital to fund startups. Doerr said it was. Although IBM had created enormous opportunities for companies like Lotus and Compaq, there definitely had been a chilling effect for new ventures.

Kildall asked how that affected innovation. Didn’t we need startups to create innovation and set new directions for computing? Doerr said it was still possible to innovate within the IBM standard–or as he called it, the “industry standard”–adding that both software and hardware companies were still creating new products. Then there was Apple, which continued to operate outside the industry standard. Alsop added that IBM was less concerned with the user when designing computers and more concerned with the organization and the corporation. As a result, you ended up with computers that were more difficult to use and it was more difficult to get people into computing and understand its benefits.

Cheifet asked about Apple. How serious was its move into the business market? Alsop said it was very serious. The company’s future depended on whether it proved capable of selling its computers to businesses. As he previously said, Apple focused so strictly on the individual that there were limits to using Apple machines in an organization.

Kildall pointed out that Apple was presently oriented more towards the educational market. Doerr chimed in, joking, “I like to think of Apple as a huge, vertically integrated advertising company.” By that he meant that Apple had tremendous brand awareness among consumers. But corporate America had decided on the industry standard. That was what you found in offices throughout the land.

Cheifet said that one of Apple’s criticisms of IBM was the “IBM mainframe mentality,” and that Big Blue really didn’t understand what a personal computer was. Doerr retorted that IBM had managed to sell quite a few personal computers, so he thought that criticism was tough to defend. Kildall pointed out that if you looked at the IBM PC, it largely duplicated Apple, just with a different processor. But both machines relied on memorymapped video and small diskettes. Doerr noted that IBM’s PC division originally operated like a startup. For the first 18 months it was effectively an independent business unit that produced “breathtaking” results. Since then IBM had become more sluggish, more concerned about compatibility, and there’d been more warring between factions within IBM over sales and marketing responsibilities.

Cheifet then asked about the IBM PC/AT. Alsop said at this point, it was a great machine. It was extremely fast and offered benefits to both corporations and individuals. But IBM had some problems in delivering certain AT models, particularly one with a built-in hard disk drive. Indeed, IBM was having problems with all of its current products, including the PC, the PCjr, and the XT. Kildall quipped a $6,000 AT wasn’t exactly a home machine. Doerr said the AT’s importance was that it put a stake in the ground for the next generation of systems. And it remained a fundamentally open system, so we’d see a lot of innovation around it.

Kildall asked if he thought IBM would try and close up the system to some extent during the next generation. Doerr said that would only happen if IBM could get control of application software like *Lotus 1-2-3* and *WordStar*. But right now, IBM didn’t control “the whole solution.”

IBM Not Telling the “Whole Truth”

The thesis of Paul Schindler’s closing commentary was, “Sometimes the truth isn’t the whole truth.” He was speaking here of IBM’s reputation for excessive corporate secrecy–specifically, its refusal to provide meaningful guidance on product direction, on or off the record. Given IBM’s size and power, Schindler said IBM got away with such tactics. And until the day the company was no longer number one it would continue to be secretive.

Computers Sell Shoes as Slide Rule Becomes Forgotten

Stewart Cheifet presented “Random Access,” which dates the episode in mid-March 1985.

- For the first time in its history, Apple temporarily halted production for one week at its manufacturing plants in California, Texas, Ireland, and Singapore. Employees were placed on forced, paid vacation as Apple struggled to bring its "bloated inventory" under control. Cheifet noted that personal computer sales overall were at a standstill, with most sales taking place in the corporate market, where Apple remained weak.
- Apple did announce an upgrade for its Apple IIe machine. The enhanced IIe included the same microprocessor as the more recent Apple IIc and added three ROM chips to improve graphics, speed processing, and provide a mouse interface. The price of the enhanced IIe would be the same and current owners could purchase an upgrade for $70.
- The Tsukuba Science Expo opened in Japan. Cheifet noted the focus on robotics, including a robot that could draw lifelike sketches and another robot that could read music and play it on an organ. Other exhibits included NEC and Fujitsu showing off a new real-time language translation computer and an $8 million American pavilion focused on artificial intelligence.
- The U.S. General Services Administration brought in a computer to monitor and analyze telephone calls made by government employees. The computer's software looked for frequently called and "odd" numbers to determine if employees were abusing the phone system. Cheifet said civil libertarians claimed this was the worst case they'd seen of a government using computers to snoop on its citizens.
- Paul Schindler reviewed *PFS:Proof*, a $95 spell checker published by Software Publishing Corporation. He said it was "faster and easier to use" than other spell checkers on the market.
- Adidas announced plans to release the Micropacer, a $100 computerized running shoe. Cheifet said the computer was built-in to the left shoe and measured the wearer's average running speed, length of stride, and calories burned.
- In other computer-related shoe news, retailer Florsheim had installed four automated stores called "Convenience Centers," which allowed a buyer to sit at a computer terminal hooked up to a laserdisc player. The machine could measure the customer's feet, analyze inventory and

provide options in their size, and allow the customer to make a purchase using a credit card.

- Pet food manufacturer Alpo announced a new national lost pet database that relied on computer identification tags.
- Keuffel and Esser Co., once the major manufacturer of slide rules in the United States, said it had sold less than a dozen slide rules in the last three years. Cheifet noted that according to a recent survey, 75 percent of college students didn’t even know what a slide rule was. ## The Failure of *TopView* and Playing the “What If” Game After many episodes of buildup on *Computer Chronicles*, we finally got to the proverbial fireworks factory called *TopView*. But contrary to the bullish prediction by Norm DeWitt that this was a product that IBM would continue to develop and grow for many years to come, *TopView* was–much like last week’s *Lotus Jazz*–basically a flop from the outset. Development effectively ceased after 1987 and IBM discontinued *TopView* altogether in 1990.

Tech journalist John C. Dvorak said *TopView* failed because it “was mostly a clunky task-switcher with some multitasking capabilities.” On the other hand, tech historian Jimmy Maher said *TopView* “was a more impressive product than it’s generally given credit for being even today.” Maher noted that *TopView* had “true preemptive multitasking,” i.e., the ability for the operating system to “wrest control from — to preempt — individual applications,” thus preventing a single application from crashing the entire system. Maher pointed out that Microsoft Windows didn’t have this capability until Windows 95, and the Macintosh couldn’t do this until the first OS X release in 2001.

Still, even Maher conceded that *TopView*’s character-based interface “resembled something IBM might have produced for the mainframe market back in the day more than it did Windows and the other microcomputer GUI environments that were its ostensible competitors.” Indeed, the market was already starting to shift towards GUIs with the Macintosh and even Digital Research’s *GEM*. And Microsoft Windows was coming, even if it was still considered vaporware when this episode taped in March 1985. In that sense, Gary Kildall was spot-on when he critiqued IBM for “playing it safe” with *TopView*.

Actually, I wonder what would have happened if IBM and Digital Research had been able to reach a proper licensing agreement to distribute CP/M with the original PC. Given that Kildall and Rolander were already working on multi-tasking and GUIs even before the PC arrived, IBM could have found itself ahead of the curve in 1985. Indeed, the AT could have shipped with a fully-functional GUI and effectively forced Apple to abandon its (already shaky) strategy of trying to compete in the business market against IBM.

(As long as I'm playing the what-if game, if Microsoft had never entered the operating system market, I could have seen a scenario where it ended up being acquired by Digital Research as its "consumer products" division. According to Tom Rolander, there had been some conversations between Kildall and Gates about a possible merger before the IBM affair. And given Microsoft was already making in-roads in consumer-level applications at this time–an area that DRI didn't really focus on–a combination of the two software companies would have made sense.)

The bigger lesson from *TopView*'s was that IBM simply couldn't extend its control over the PC hardware standard into software. That genie was already out of the bottle. And without dominating the software market, IBM started to slowly lose its iron grip over hardware. So while Norm DeWitt said he expected IBM to control as much as 50 percent of the worldwide PC market by 1989, in reality it ended up being around 30 percent. As it turned out, March 1985 was right around the height of IBM's PC dominance, and it would be a long road down from here. ## Rolander and Kildall Pursued Early Vision for CD-ROM Software

Tom Rolander was identified in this episode as vice president of engineering with Activenture, not Digital Research. There was no actual discussion of Activenture or what it did. In fact, it was another company started by Gary Kildall to pursue his well-known interest in optical storage technology.

By 1983–right around the time Kildall began his involvement with *Computer Chronicles*–Rolander said he decided to quit his job at DRI because his engineering department had grown too large for him to manage. Rolander wanted to go back to simply writing code. Kildall convinced

Rolander to stay at DRI in a new position, vice president of research and development, effectively acting as the company's chief technology officer.

In this new role, Rolander said he and Kildall started working with a small team on a "big laserdisc product." During this time, Kildall learned about the new compact disc (CD) coming out of Japan (the subject of another prior *Chronicles* episode). Kildall was so excited by the possibility of using the CD for data storage, he started Activenture to focus on that concept. Rolander then resigned from DRI to continue his work at Activenture. A short time later, Activenture renamed itself KnowledgeSet after Activision–the computer game publisher–objected to the similar-sounding name.

KnowledgeSet released the first encyclopedia on CD-ROM–a digital version of the 20-volume *Grolier's Encyclopedia*–in 1986. But CD-ROM software was a tough sell in the mid-1980s, Rolander noted, as the early drives cost upwards of $1,000. Eventually, Kildall sold KnowledgeSet to Banta, a large Wisconsin-based printing company.

Rolander stayed with KnowledgeSet for a short time after the Banta acquisition before starting another company, PG Soft, with another former DRI employee (and *Chronicles* guest), Lee Lorenzen. PG Soft primarily developed utility programs. Novell acquired PG Soft in 2001. Rolander then started another company, CrossLoop, Inc., which produced screen sharing software. Rolander served as CrossLoop's chief technology officer until 2012, when the company was sold to AVG Technologies. Today, Rolander continues to work as a software engineering consultant and as a mentor at Stanford University's Hopkins Marine Station in Pacific Grove.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of March 26, 1985.
- You can also watch the Computer History Museum's interview with Tom Rolander, conducted by David Laws, on YouTube.
- Robin Garthwait referred to Herman Hollerith as the founder of IBM's "parent company." Hollerith started the Tabulating Machine Company in 1896, which as Garthwait noted manufactured the machine that he'd

initially developed to tabulate the results of the 1890 U.S. census. In 1911, Hollerith sold Tabulating Machine Company to a holding company formed by Charles R. Flint and dubbed the Computing-Tabulating-Recording Company (CTR). In 1914, CTR hired Thomas J. Watson, Sr., a former sales executive with National Cash Register, to run the holding company. In 1924, Watson assumed complete control after CTR's chairman died and renamed the company International Business Machines. In that sense, Watson was effectively the founder of what we now know as IBM. (For a much more thorough discussion of IBM's founding and history through the personal computer era, I recommend episode 95 of the video game history podcast *They Create Worlds*, co-hosted by Alexander Smith and Jeffrey Daum.)

- Norm DeWitt remained with DataQuest until 1989. He then took a job as vice president of customer support at Software Publishing Corporation, the publisher of the previously mentioned *PFS:Proof*. He later took a similar role with Informix, a database software company, and apparently retired from the industry sometime in the 1990s. Like Kildall and Rolander, DeWitt is also a pilot. He's even built his own planes for aerobatics competitions and currently serves on the board of directors of the Experimental Aircraft Association.
- Stewart Alsop II continued to publish his *PC Letter* until the mid-1990s, when he decided to become a venture capitalist. He's currently a partner in the venture capital firm Alsop Louie Partners.
- Speaking of venture capitalists, John Doerr remains associated with Kleiner Perkins to the present day. He led the firm for many years before stepping down from day-to-day management and taking the role of chairman in 2016. During his tenure, Doerr led the firm's investments in a number of well-known tech companies, including Alphabet (Google), where he continues to serve on the board of directors. According to *Forbes*, Doerr is the 51st-richest American, with a net worth of $15.2 billion.
- Bill Godbout (1939 - 2018) worked for IBM right after graduating from college. He later started his own company, CompuPro, where he developed parts for the Altair 8800. He later renamed the company Viasyn and refocused the business on computer networking. Tragically, Godbout and his family died when their house burned down during the November 2018 "Camp Fire" in California.

Chapter 12: The Equalizer, Computer Colorworks Digital Paintbrush System, AT&T UNIX PC, and GRID Compass 1101

In the early 1980s, there were two major antitrust settlements that significantly impacted the evolution of the computer industry. The first was the U.S. Department of Justice's decision to withdraw its long-running antitrust case against IBM, which began in 1969. That lawsuit focused on IBM's dominance in the mainframe and minicomputer markets, and the government's retreat helped clear the path for IBM to aggressively enter the microcomputer market with the IBM PC.

The second event, which also took place in 1982, was a consent decree resolving the DOJ's antitrust lawsuit against AT&T, which began in the mid-1970s. The decree led to the breakup of the Bell System's local telephone service monopoly. While regional companies would take over the local service, AT&T would now focus exclusively on long distance telephone service.

One side effect of the Bell breakup was that it also freed AT&T from a restriction imposed by a prior 1956 consent decree that barred the company from selling computers and related products. This subject has been discussed in prior *Computer Chronicles* episodes, notably with respect to UNIX, the operating system initially developed at Bell Labs.

This next *Chronicles* episode from 1985 focuses on both IBM and AT&T as they attempt to take the next step in the evolution of the microcomputer market–communications. We're still a decade away from anything resembling the modern Internet, so the focus here is more on how to integrate personal computers with the existing telephone system. We also start to see how other businesses are slowly dipping their toes in the water of consumer-level "online" services.

Computers and Telephones Living Together! Mass Hysteria!

Stewart Cheifet's cold open features him driving on a local freeway–rather unsafely–while talking on a Motorola car phone. He explained that it was thanks to computers he could carry on this conversation. After all, the car phone relied on computers to "hand off" his conversation between various relay stations.

Back in the San Mateo studio, Cheifet showed Gary Kildall a small handheld terminal device with a wireless antenna that could access a minicomputer located in Washington, DC, and access information such as stock quotes. Kildall said this was a good example of how computers and communications complemented one another. Back in the days of computer timesharing, users had to share data through a single machine. Personal computers brought that data onto the individual desktop. And while a lot of that data, such as letters and spreadsheets, were personal, there were other forms of data–notably large databases and electronic mail–that were changing dynamically everyday. This was where communications was really important. It allowed the personal computer to get at this dynamically changing data, which could not be locally generated.

The Coming of "Intelligent Phones"

Robin Garthwait presented her first remote segment, which provided an overview of a pilot project underway in the Harrisburg, Pennsylvania, area–coincidentally, the location of one of *Chronicles* sponsoring PBS stations–as the first step in creating a national fiber optic network capable of transmitting up to 1.7 billion bits of data per second. Garthwait noted that was the equivalent of roughly 170,000 simultaneous voice conversations. The fiber network relied on lasers that transmitted the data as pulses representing the digital bits. Since there was no need to convert the digital signal to analog, Garthwait said the fibers could carry computer data just as easily as voice data.

As part of the Harrisburg project, Garthwait said customers could also choose some "remarkably intelligent phones." For example, there was a phone attachment that featured an LCD readout, which identified and stored the numbers of incoming calls. There were also phones that could remember the last call you made, or one that you just missed. The fiber system could even trace and reject calls from people that you would rather avoid.

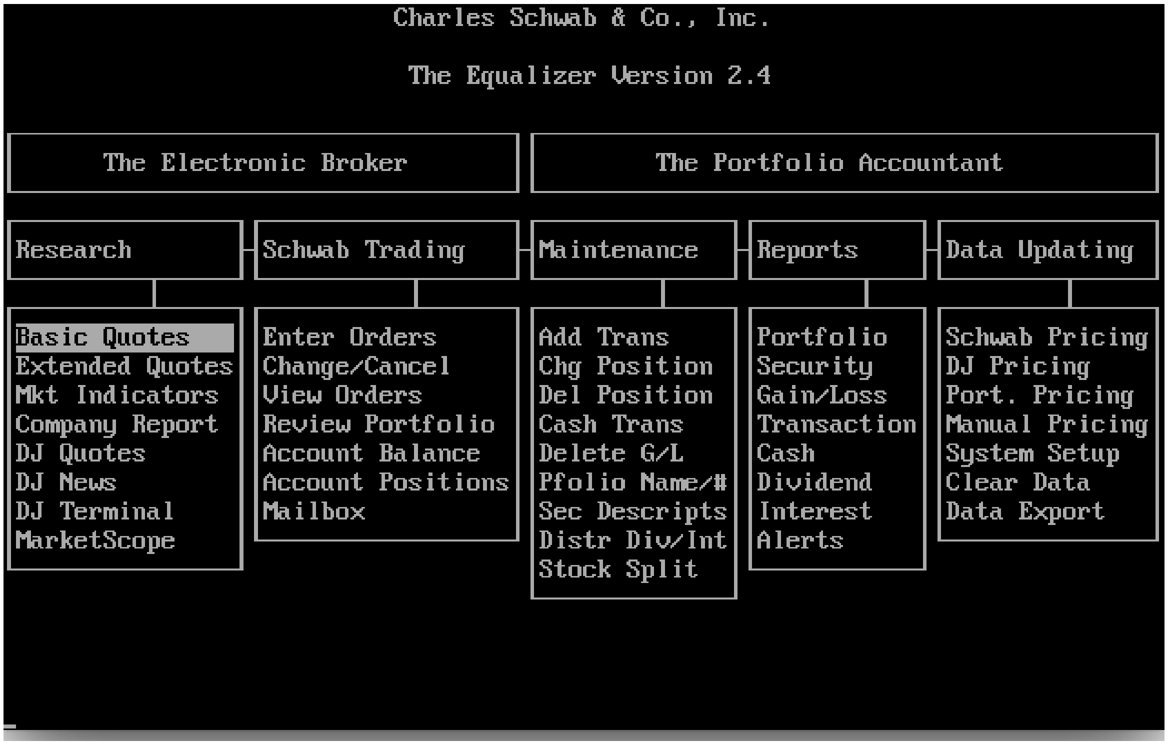
PC Owners Could Now Be Their Own Stockbroker

The first studio round table had William F. Gillis and Bob Metcalfe join Cheifet and Kildall. Metcalfe created the Ethernet computer networking standard while working at Xerox PARC and later co-founded 3Com Corporation to commercially develop the technology. Kildall asked Metcalfe if he saw any inherent limitations on using the “inherited” phone system to network computers. Metcalfe said that personal computers were getting smarter and smarter very quickly, and as they did they wanted to communicate more and more information. That was beginning to stress the 100-year-old telephone network. He added that while there was a lot of progress being made by the telecommunications companies to increase the amount of data they could handle, there were other potential means as well, such as cable television.

Cheifet asked Metcalfe to explain the importance of moving from an analog to a digital telephone system. Metcalfe said the transition, which began 10 to 15 years earlier, meant not only reducing costs but also providing communications that were more suitable for computer networking.

Cheifet then turned to Gillis, an executive with the Charles Schwab Corporation, a popular discount brokerage, to demonstrate an application that relied on computer communications to provide stock quotes. Gillis explained Schwab’s quote service made this information accessible from any touch-tone telephone, which he demonstrated with a phone hooked up in the studio. Essentially, this was an early example of a phone tree system. Cheifet described it as using the telephone as a kind of computer terminal to access another company’s database. Kildall asked if a customer could actually place a stock order with this phone service. Gillis said no.

But Gillis then showed another, software-based product that did make it possible for users to trade stocks directly. This was called *The Equalizer*. Gillis said the software allowed you to not only buy and sell stocks, but also conduct research and maintain your overall portfolio. He demonstrated *The Equalizer* by using his own account to purchase some shares of Metcalfe’s 3Com Corporation. Cheifet said the software basically allowed you to act as your own broker. Gillis said that was correct. The user could format their orders locally–which saved on communications costs–before going online to check the current market price and execute the transaction. (Below is an image of the main menu of a later version of *The Equalizer* software released in 1991.)



A text-based menu system. There are two broad categories, “The Electronic Broker” and “The Portfolio Accountant,” with five menus underneath: Research, Schwab Trading, Maintenance, Reports, and Data Updating.

Kildall said this was a good example of using local computing to prepare an order and then connecting to a bigger system to make a transaction that could not take place locally due to the need to access a larger database. Gillis added that there were thousands of stocks being traded, and that database would overload the capacity of most small computers.

Cheifet clarified that *The Equalizer* actually placed orders directly. Gillis said that was correct. The order was examined by a Schwab broker who then just had to hit “one key” to forward the customer’s order to the stock exchange.

Kildall asked Metcalfe where he saw technology like this going. Metcalfe reiterated his earlier point that as computers become smarter and smarter their appetite for information would also grow dramatically. In addition to databases, he said another area that would fuel this growth would be electronic mail.

Cheifet asked how much of an impact the breakup of AT&T and the subsequent deregulation–i.e., the lifting of the 1956 restrictions–would actually play a role in promoting computer communications. Metcalfe said the prior regulation tended to put a wet blanket on innovation. Now that a higher level of competition had been introduced, we could expect a higher turnover of new technology, particularly in the field of communications.

Kildall asked about alternatives to the telephone system, such as satellite. Could that ever take the place of the phone system for individual computer users as opposed to corporations? Metcalfe said there was some direct satellite communication to homes, but it would be some time before such technology would be practical on a larger scale, as you needed the ability for 2-way communication. There was a similar problem with using cable television. It was currently a 1-way system, but companies were looking into using it as a 2-way technology for computer networking.

Kildall concluded the segment by noting that the real challenge right now was simply to use the existing telephone system to its best advantage. Metcalfe agreed, pointing out the telephone infrastructure represented a vast investment that you didn't want to just throw away.

"Millions of Islands of Computing That Must Be Linked Together"

The next segment began with Stewart Cheifet narrating some B-roll footage of Bell Labs. Cheifet went to Bell to interview Steven Bauman, the executive director of AT&T Information Systems, about the company's new PC 7300, also known as the UNIX PC. Cheifet said the 7300 represented a different approach from AT&T's first computer products by relying on the company's traditional strength in data transmission. The UNIX PC was specifically designed for multi-user, multi-tasking applications. It featured overlapping windows–similar to the Macintosh user interface–a UNIX operating systems, and a built-in telecommunications manager.

Bauman said the 7300 took the plain old telephone and hooked it into a machine such that the user could control who they were calling. For instance, when a telephone call came in, the user could pull up a history of their last five conversations with that same person.

AT&T
PC 7300
AT&T PC7300
1985
Also known as the UNIX PC, the PC7300 was AT&T's attempt to enter the business computer market. This version offered 512KB of memory and a 5MB hard drive. The overall design was innovative and modern looking for the 1980s, which led to it being used in a number of movies and TV shows such as Miami Vice (1986), Broadcast News (1987) and The Secret of My Success (1987) as the token computer.

The AT&T PC 7300. A 1980s-style personal computer with a detached keyboard, a three-button mouse, and a small monitor on top of the main computer unit.

Cheifet said the 7300's "telephone with a memory" and electronic mail features were designed to interface with AT&T's 1 MB data network, which provided fast, all-digital transformation of voice and data together. In that respect, AT&T's UNIX PC replaced the need for a traditional computer modem. Bauman noted that UNIX was the "magic" that allowed the system to integrate communications with computers.

Cheifet noted that some computer watchers believed the next computer era would be a battle between AT&T and IBM. Bauman said he didn't see it that way. IBM was a competitor, he said, but he saw AT&T as another American company that would help the industry prepare for the "real onslaught" that was coming from Japanese computer manufacturers.

On that point, Cheifet said there was a basic difference between how American and Japanese companies approached data distribution. While the Japanese gave higher priority to making mainframes more friendly, the United States took a more local approach. Bauman noted that Americans were fiercely independent and liked to be autonomous. That meant they wanted control over their data. This led to the creation of "millions of islands of computing that must be linked together." Once we solved that problem, he said that other issues like user friendliness would be easier to address.

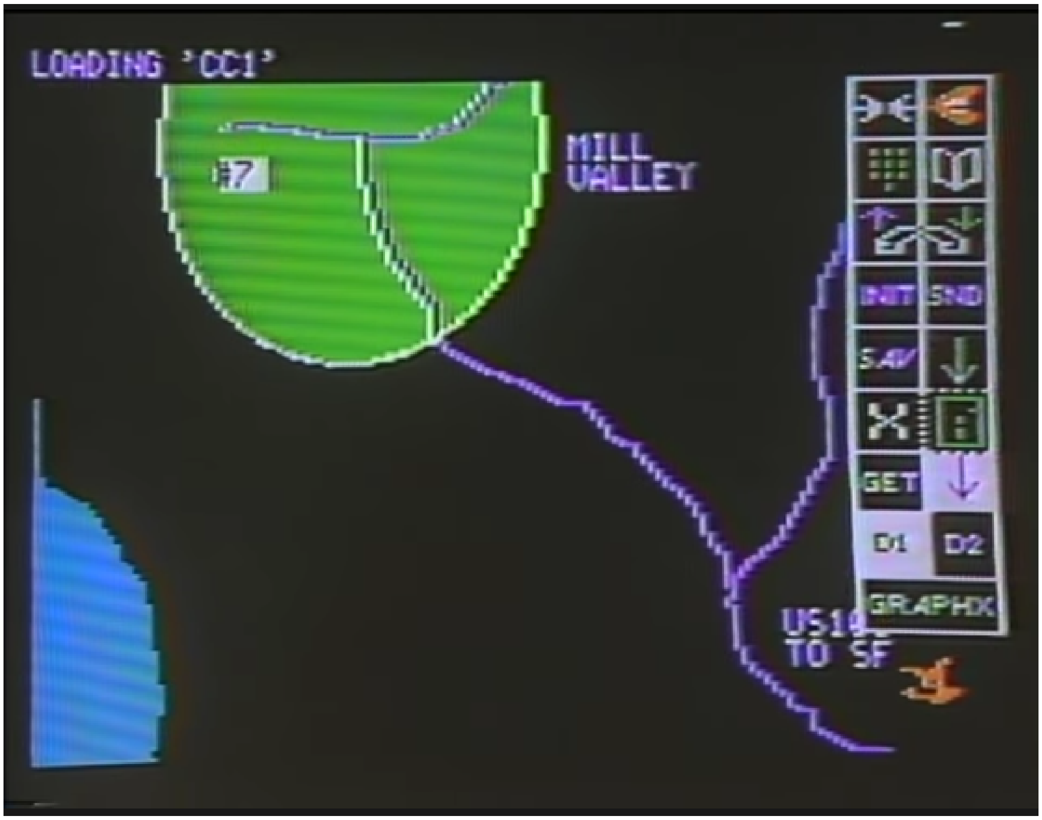
IBM Makes Its Own Move Into Communications

Meanwhile, IBM had taken steps to add communications to its computer expertise by acquiring ROLM Corporation, a leading manufacturer of telecommunications equipment. Robin Garthwait interviewed ROLM's customer marketing manager, Joann Yates, about the merger of voice and data transmission. Yates said the goal was to make accessing data as easy as making a phone call. Right now, nobody had to think twice about picking up a phone and calling someone anywhere in the world. But it was much more difficult when you wanted to call any computer in the world. ROLM's goal was to make it as simple as possible to do both without sacrificing one for the other.

Garthwait said products such as the ROLM Cedar, combined the capability of a personal computer with a highly developed telecommunications function. Yates said products like the Cedar were designed for the "communication-intensive knowledge worker" who could not afford to sacrifice their phone calls for their computer. The fact that PCs were becoming more commonplace and people wanted to do both things at once placed more pressure on the telecommunications industry to respond.

Online Graphics and Military-Grade Encryption

Back in the studio, Glenn Albinger and Barry Margerum joined Cheifet and Kildall. Albinger, the director of software systems for The Computer Colorworks, demonstrated his company's product, the *Digital Paintbrush System*. This was an early example of software that could actually transmit bitmap images over telephone lines. Albinger linked the computer in the studio to his company's computer in Sausalito (about 30 miles away). The Sausalito computer loaded a map of the area drawn using the *Paintbrush* software and transmitted it to the studio computer (see image below). Albinger noted you could not talk on the phone and transmit the picture at the same time.


LOADING 'CC1'

A demo of the Digital Paintbrush System. The main image is a representation of a map of Mill Valley, California. There is a toolbar on the right side of the screen.

Cheifet turned to Margerum, a vice president with Grid Systems, and asked about the concern some people might have with the security of data sent over telephone lines. Margerum noted his own company's product, the GRiD Compass line of portable computers, recently incorporated “high-grade embedded encryption” as a standard feature. This meant the user could transmit data by telephone lines, satellite, or even microwave encrypted, so if the data were intercepted it couldn't be exploited. Margerum then provided a brief demo using two Compass machines hooked up locally.

Kildall noted the obvious military applications for this encryption technology. Would encryption eventually make its way into the business market? Margerum said absolutely. The military was probably the area that had the most concern over data privacy. Civilian government agencies were also concerned. And the commercial world was the next market to look at, although Margerum said businesses haven't seen the need to spend their money in that area. He thought when a “major catastrophe” happened, they'll realize that their information was available to those who want it.

Cheifet asked about the practical uses for a machine like the Compass. Margerum said it was a portable, solid-state machine with no moving parts. It could take a 42-inch drop and still work effectively. So from a military standpoint, because it was powerful, lightweight, and had built-in communications protocols, it was an ideal system for field use.

Was Any of This Necessary?

Paul Schindler's closing commentary lamented that there were a lot of things that would be possible with communications and computers that weren't necessary but would be done anyway. For example, there will be more and more electronic mail even though some people would wish letters weren't delivered so fast. Basically, nobody was answering the question if any of this communications technology was necessary or practical. He said the U.S. could follow the example of France, which was making more "sensible" use of technology by replacing their printed telephone books with computer terminals.

Compaq, Texas Instruments Announce New Machines

Susan Bimba presented this week's "Random Access" segment, which dates the episode around March-April 1985.

- Compaq jumped into the computer-telephone market with six new products, including a new line of IBM compatibles called the TC-2500 telecomputer.
- Texas Instruments announced a new IBM PC-AT compatible called the Business Pro. The TI machine would come standard with 512 KB of RAM and a single 5.25-inch floppy disk drive for $4,000. Bimba said TI expected these new machines to double the company's current 1 percent market share.
- National Semiconductor announced two new products designed to compete with IBM's Sierra line of mainframes.
- Gene Amdahl's Trilogy Limited, which recently abandoned efforts to develop a new supercomputer, acquired Elxsi for $64 million, which as Bimba noted had developed a supercomputer but lacked capital.
- Boeing Computer Services–a subsidiary of the famous aircraft manufacturer–recently released *Boeing Calc*–a commercial spreadsheet program that relied on online storage rather than local memory. Bimba said Boeing's software was "truly three dimensional" and could store up to 1,000 pages.

- Paul Schindler reviewed *Higgins*, a $400 desk organizer program published by Conectic Systems, Inc., in Portland, Oregon.
- Bimba said Silicon Valley companies were now making efforts to clean up the industry's reputation for encouraging and tolerating cocaine use. One unidentified company had gone so far as to fund an undercover police investigation of its own plant.
- The Handley School for the Blind in Illinois developed a new braille computer that can print 400 Braille characters per second, up to 600 lines per minute. Bimba noted that a Braille textbook that once took a full year to produce could now be ready in just a few weeks.
- Rohm and Haas, a Pennsylvania manufacturer, recently received a $46,806.37 tax penalty after it shorted the IRS 10 cents on $4.5 million in tax deposits made during 1983.

The Many Professional Lives of Bob Metcalfe

Although he's not the focus of this episode, Robert Metcalfe is probably the most well-known of the guests. As previously noted, Metcalfe developed Ethernet and co-founded 3Com. But he left the company abruptly in 1990 after the board of directors passed him over for the CEO position in favor of Eric Benhamou. In a 1998 *Wired* profile, Metcalfe told writer Scott Kirsner that he was still smarting over the snub:

> "Benhamou is a nerd who can't give a presentation," says Metcalfe, still irritated eight years after the fact. "He's not horrible, but he's not charismatic." But Metcalfe acknowledges that it was Benhamou, not he, who won 3Com entry into the Fortune 500 and grew it into a US$5 billion powerhouse. "I've learned watching him that you don't have to be charismatic to be a great CEO. To this day, he doesn't have a charismatic bone in his body."
>
> Metcalfe, by contrast, is a cauldron of charisma. He is tough and charming, a persuader who knows how to listen, a provocateur who miraculously avoids making too many enemies. That combination of qualities made Ethernet a networking standard (today, it connects more than 100 million computers) and enabled Metcalfe to raise the first million dollars to launch 3Com.

About a year after leaving 3Com, Metcalfe decided to join the media himself, taking over as the publisher of *InfoWorld*, where he also wrote a weekly column. Metcalfe continued as an executive and columnist with IDG, the parent company of *InfoWorld*, until 2000. He then spent a decade in venture capital before transitioning into academia. Just recently, Metcalfe announced he would be stepping down from his position at the University of Texas-Austin, where he's been an endowed professor in the Cockrell School of Engineering since 2011.

Gillis Clashed With Schwab "Culture"

The other guest I want to single out here is William F. Gillis. He began his career in marketing with RCA's consumer electronics division in the 1970s before moving to jobs at AT&T and Western Electric. In 1981, Gillis joined the toy company Mattel to oversee its home computer division, which produced the ill-fated Intellivision video game console and Aquarius home computer.

It was in 1983 that Charles Schwab recruited Gillis away from Mattel to run its new Schwab Technology Services division. In his book about the history of Charles Schwab, author John Kador said Chuck Schwab himself told Gillis, "We are running this division as an entrepreneurial start-up. I want you to develop products and services to help individual investors make better investment decisions."

The relationship later soured, however, and Gillis left the company a few years later. In his autobiography, Schwab himself recalled, "We brought in a brilliant guy named Bill Gillis to head Schwab Technology, but with a 'my way or the highway' approach, he eventually clashed and left." Kandor offered a more nuanced take on what transpired:

> Gillis was a supremely talented manager. In the software development industry where most projects are late and over budget, Gillis delivered the goods. Gillis could have written his own ticket at Schwab. But he made a classic mistake to which technologists are prone: He overstated and in doing so he violated a key piece of Schwab culture. In response to a question, Gillis announced that Schwab expected to sell 50,000 SchwabQuotes subscriptions. Chuck was aghast. Schwab people simply didn't make such projections.

I would also point out here that Gillis is African-American. Indeed, he's as far as I can tell the first African-American to appear as a guest on *Chronicles*. And as Kandor noted, he was also one of the "few African-American executives" in Charles Schwab's history.

Fortunately, Gillis went on to have a long and successful career after Schwab. He served as president or CEO for a number of companies, including US West Enhanced Services, Motorola INFO Enterprises, and Parent Care, Inc., the latter of which he co-founded in 2003. Gillis also continues to work as a consultant in the industry.

UNIX PC Proved a Flop Despite Quality

As for the products featured in this episode, the AT&T UNIX PC was probably the most notable in the sense of being a commercial failure. According to one report from July 1987:

> The 68010-based Unix PC or PC7300 developed and manufactured for AT&T by Convergent Inc has proved to be such a commercial disaster that the machine is now going out at fire sale prices in the US, leading observers to conclude that Convergent must have sold its excess stocks of the machine as a job lot to a third party. The machine is currently available at $1,900 for a 2Mb processor with 67Mb disk drive, documentation and extras, compared with about $5,400 list. The MS-DOS coprocessor is $140, down from $700.

That's not to say that the 7300 was a bad computer. It reviewed quite well. Alastair J. W. Mayer, writing for *Byte* in May 1986, said it was "an excellent machine." He cited the computer's overall reliability, solid library of included software, and communications capabilities as key features. Mayer's main criticism was the lack of color graphics, especially given the machine's high sticker price. But he said it was still worth it given the PC 7300 came with a fast hard disk drive.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast data of April 2, 1985. Based on a computer display seen in one of the studio demos, the recording date was apparently March 9, 1985.
- Joann Yates remained with ROLM Corporation as its marketing manager until 1991. She later spent many years as a senior marketing manager with Sun Microsystems. She is currently retired and living in California.
- Barry Margerum was Grid Systems vice president of defense industry marketing from 1980 to 1988. Before that he'd worked at IBM and Apple. After leaving Grid, Margerum served as CEO at MITEM Corporation, an

enterprise software company, and later at Euphonix, Inc., a high-end audio equipment manufacturer. Between 1993 and 2017 Margerum primarily worked for Plantronics (now known as Poly), another high-end audio equipment manufacturer. Currently, Margerum is an "angel investor" who provides seed funding to tech startups.

- I don't have anything to report regarding the post-*Chronicles* activities of Steven Bauman or Glenn Albinger.
- The Computer Colorworks was owned by Jandel Corporation, which dissolved in 2003. According to an August 1984 *InfoWorld* article, *Digital Paintbrush* initially sold for Apple II systems for $299 and was essentially marketed as a low-cost alternative to the Apple Graphics Tablet, which cost around $800.
- The ROLM corporation was so named because it incorporated the first letters of the last names of the company's four founders (Richeson, Oshman, Lowenstern, and Maxfield). According to a 2018 *Medium* article by Wayne Beck, the ROLM founders started their company in 1969 before deciding on a product line. They eventually settled on creating portable computers for the military (similar to GRiD Systems). But ROLM later diversified into computerized telephone switching systems, which eventually became its main product. IBM purchased a 23 percent share of ROLM in 1982 before acquiring it outright in 1984. Just five years later, IBM sold its ROLM division to Siemens AG, which kept producing products under the ROLM name until the mid-1990s.
- John Ellenby, a British businessman, started Grid Systems Corporation in 1979. The GrID Compass was the company's signature product line. As Allison Marsh explained in a May 2020 article for *IEEE Spectrum*, the 10-pound Compass was the first portable computer with a "clamshell design, in which the monitor folded down over the keyboard." The machine cost $8,150 when it was released in 1982, but it did come with a host of built-in business software and a 1200-baud modem. The Compass gained fame as "NASA's original laptop" for use in space shuttle missions. Ellenby sold Grid Systems to Tandy Corporation in March 1988 in an all-stock deal. Grid continued as a subsidiary under Tandy. AST Research, Inc., subsequently acquired Tandy's computer manufacturing operations in March 1993 for $175 million. AST shut down the Grid division but the name was purchased by a group of former managers, who formed a new company under the name GRiD Defence Systems, which still exists today.
- Paul Schindler's reference to the French was specifically about the Minitel, an online service introduced throughout France in 1982, which relied on

distributing free computer terminals to telephone customers. The Minitel will be featured in a later *Chronicles* episode.

- Perhaps confirming (the person) Charles Schwab's disdain for bold projections of product sales, Bill Gillis had told the press while at Mattel in 1983 that the Aquarius computer would sell a "minimum" of 200,000 units and claim a 5 percent market share, according to *The Dot Eaters*, a video game history website. Mattel reportedly sold less than 8,000 units and pulled the machine from the market four months later, by which time Gillis had already left for Schwab.
- I wonder if Charles Schwab ever advertised *The Equalizer* on the television series of the same name, which premiered on CBS in September 1985.
- The image of the AT&T PC 7300 used above is by Lee Leblanc for the Goodwill Computer Museum and is used here under a Creative Commons Attribution 2.0 Generic license.

Chapter 13: The Atari 520ST and Commodore 128

In my last post, I discussed Bill Gillis, then a Charles Schwab executive in charge of its technology division. Gillis came to Schwab from Mattel, the toy manufacturer best known for Barbie. In the early 1980s, Gillis oversaw Mattel's efforts to compete in the video game console and low-cost computer markets with the Mattel Intellivision and the Mattel Aquarius, respectively. The Intellivision proved to be a modest success. The Aquarius, however, was such a bust that Mattel effectively pulled it off the market after just four months in 1984.

Mattel was far from the only company to exit the computer business in this period. Many of the small computer manufacturers profiled on *Chronicles* to this point–Vector Graphic, Morrow Designs, Osborne, and Gavilan to name a few–were dead or on their last legs by mid-1985. But those firms competed in the mid- to high-end business market. Mattel was in what was considered the "low-end computer" market, which was just another way of saying the sub-$1,000 home computer market. Here, too, there was a transition underway with many early players like Texas Instruments and Coleco (another toy company) folding up their tents.

Two low-end manufacturers that managed to survive this period were Atari Corporation and Commodore International. Unlike the business computer companies listed above, neither Commodore nor Atari started out making microcomputers. Nolan Bushnell co-founded the original Atari, Inc., in 1972 to develop coin-operated arcade machines. When Bushnell decided to adapt video game technology into a programmable home console–what became the Atari VCS a/k/a the Atari 2600–he needed more capital to make that happen. Conditions were not favorable in the mid-1970s for a public stock offering, so Bushnell opted for the next-best thing. He sold Atari to Warner Communications, a budding conglomerate run by Steve Ross. As a division of Warner, Atari not only successfully launched the VCS in 1977 but also an early line of inexpensive 8-bit microcomputers in 1979.

Commodore's early history was even further removed from microcomputers. Jack Tramiel, a Polish immigrant and Holocaust survivor, learned to repair typewriters while serving in the U.S. Army. Tramiel and a partner started selling refurbished typewriters in New York City in the mid-1950s and eventually purchased a small shop in the Bronx. In 1958, Tramiel incorporated Commodore Portable Typewriter Limited to import typewriters from Czechoslovakia into Canada. Four years later, Tramiel changed the name to Commodore Business Machines and took the company public on the Montreal Stock Exchange. (The company was renamed again, this time to Commodore International, in 1976.)

In 1965, a major scandal involving the collapse of a Canadian finance company, Atlantic Acceptance Corporation Limited, nearly took down Tramiel and Commodore. The person at the center of the scandal was C.P. Morgan, who both controlled Atlantic Acceptance and served as chairman of Commodore. To make a long story short, Morgan was replaced as chairman by Irving Gould, who essentially bailed out Commodore and kept it going as its now-largest shareholder.

During the 1970s, Commodore entered the booming electronic calculator business. This led to Commodore acquiring MOS Technology, a Pennsylvania-based manufacturer of microprocessors. Chuck Peddle, the chief engineer at MOS Technology, told Tramiel that he was interested in building a personal computer. As Leonard Tramiel, one of Jack's sons, recently recalled on his blog *Vintage Computer Stories*, "If Commodore wanted the product [Peddle] would do it as an employee. If they didn't the[n] he would quit and do it on his own."

Jack Tramiel decided to back the project and Peddle's machine, the Commodore PET, debuted at Jim Warren's first West Coast Computer Faire in 1977. The PET was the first in a hugely successful line of low-price, 8-bit microcomputers that later included the Commodore VIC-20 and the Commodore 64.

By the mid-1980s, Jack Tramiel was the undisputed "king of the low-cost computers," as Stewart Cheifet would describe him in our next *Chronicles* episode. But that reign ended abruptly on January 13, 1984, when Tramiel resigned as Commodore's chief executive. Barbara Wierzbicki, reporting on this historic event for *InfoWorld*, suggested Tramiel quit because Irving Gould wanted to bring in an outside executive to oversee Commodore's international operations. Others said Gould thwarted Tramiel's efforts to install his three sons as senior executives within the company. One former Commodore employee told Wierzbicki that Tramiel perhaps had "the wherewithal to realize that the company has grown too large to be managed" as a family business.

But this wasn't the end of Tramiel's story. Within a year of leaving Commodore, Tramiel ended up as owner and president of Atari. This wasn't exactly the same

Atari started by Nolan Bushnell. (Bushnell himself was long gone, having been fired in 1979 from his own company.) As discussed in a January 1985 *Chronicles* episode, the North American video game market essentially melted down in late 1983 and early 1984. This left Atari, which had once been Warner Communications' most profitable division, suddenly dragging down the company's stock price like an anchor. Desperate to stem the bleeding, Steve Ross basically gave away Atari's home computer and video game console assets to a new company controlled by Tramiel. Tramiel paid no cash in the deal but instead assumed $240 million in long-term promissory notes. Tramiel then renamed his company Atari Corporation. (Warner retained Atari's original coin-operated video game business under the name Atari Games, Inc.) Tramiel then poached a bunch of his loyal former employees from Commodore and also installed his sons in key executive posts, including Leonard Tramiel as vice president in charge of software.

The Increased Expectations of Home Computer Users

Jack and Leonard Tramiel were the featured guests of this episode. The formal subject was "low-end computers." The Tramiels were there to show off the Atari 520ST, a machine already dubbed "the Jackintosh" by the press as Tramiel positioned the machine as a low-cost 16-bit alternative to the Apple Macintosh. Meanwhile, Stewart Cheifet also interviewed an executive with Tramiel's former company, Commodore, about its own upcoming product, the Commodore 128.

The episode began with Cheifet standing in the aisle of a Toys "R" Us store in Redwood City, California. Cheifet quipped that computers were now just another item on the shelves of mass merchandisers. And while companies like Coleco, Mattel, Texas Instruments, and Sinclair had now exited the low-end computer business, Commodore and Atari were still battling it out in the "low-cost computer wars."

In the studio, Cheifet and Kildall commiserated next to a Commodore VIC-20. Cheifet said this was the machine that really got the low-cost computer business started, allowing people to go out and buy a small computer for just a few hundred dollars. He noted that with all the talk about IBM and Apple, there were now more Commodores out there than any other computer. But now that Commodore and Atari were coming out with more sophisticated computers, did this mean the line was disappearing between so-called low-end computers and mid-range offerings from companies like Apple? Kildall said the "low-end" traditionally referred to the home market, and that meant pricing computers like television sets. Today, home consumers expected a lot more than they did a couple years ago. So success at the low end now required offering more sophisticated hardware and software systems.

Getting the Most Out of the C64

Robin Garthwait's first remote segment focused on how people continued to make innovative use of existing low-end computers, specifically the Commodore 64 (C64). Over B-roll footage of a San Francisco music studio, Garthwait explained that musicians used a C64 program called *Just Intonation* as an "unconventional tuning system." Unlike a traditional 12-tone scale, *Just Intonation* required re-tuning musical instruments to fit newer, simpler ratio intervals. The C64 could then generate a piece of music based on mathematical descriptions. There was no limit to the software's tonal variations–just like a human singer–and re-tuning the software was much easier than re-tuning a piano. And while the C64's sound quality restricted performance, Garthwait said the machine's role was really more of a sketchpad to test new ideas, provide background sounds, and serve as a reference for tuning other instruments.

Garthwait then profiled another unnamed application that focused on the use of graphics in low-end computers. An unidentified man used a digitizing pad and color platter to painstakingly create a library of city maps, showing the locations of projected buildings and their shadows, traffic congestion, and land usage. Garthwait said these different maps could then be printed on transparent plastic, allowing the user to highlight certain aspects of each map and study them together in an overlay.

"We Like to Sell to the Masses, Not the Classes"

The only round table for this episode featured Jack and Leonard Tramiel joining Cheifet and Kildall. (To make things easier, I'll refer to each Tramiel by their first names.) Kildall opened by asking Jack to explain his approach to marketing low-cost computers. Jack said his goal was always to bring the best technology at the lowest prices: "We like to sell the masses, not to the classes," he stated succinctly.

Kildall said Atari's new 520ST posed a threat to mid-range computers–such as the Apple Macintosh–with a base price of $800 and featuring 512 KB of RAM, a 16-bit Motorola 68000 processor, and a monochrome display. How did Atari manage to hit that price point? Jack said that by knowing and understanding the semiconductor business, you could always foresee what you were able to come out with. He noted that when development started on the 520ST, 256 KB of RAM cost $30. Today it was down to just $4.

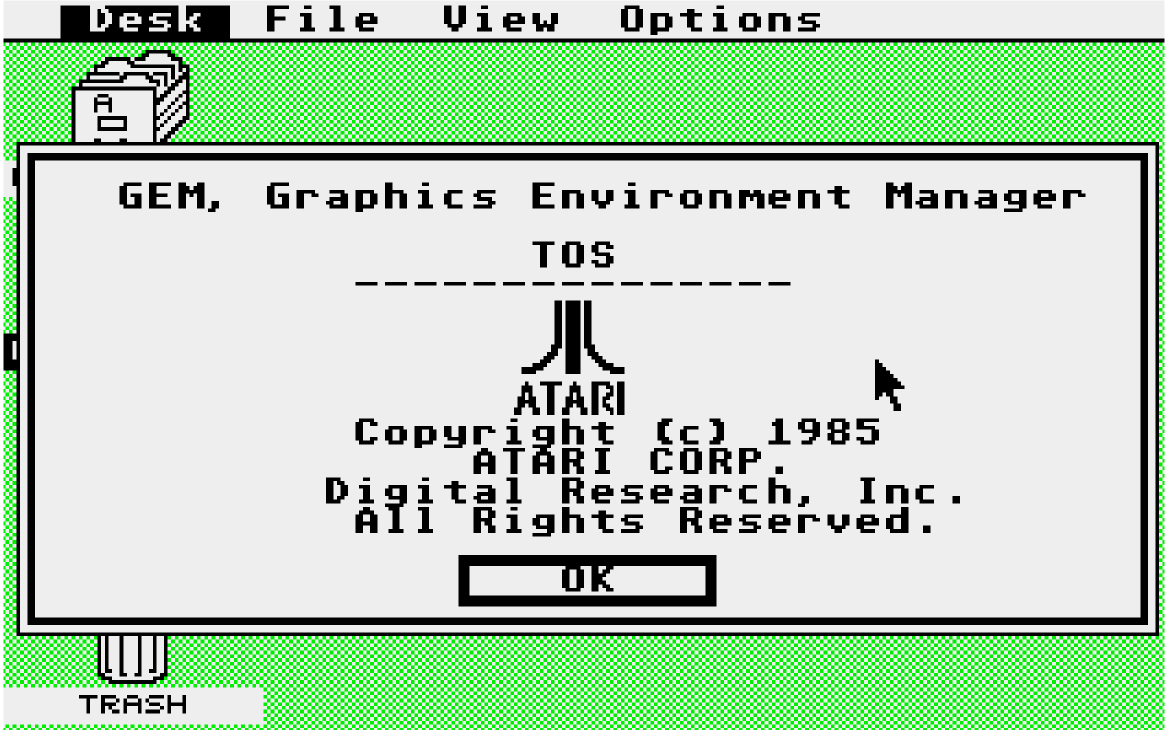
Kildall asked Jack–who famously produced his Commodore machines out of the MOS Technology factory in Pennsylvania–if the Atari machines were being built offshore. Jack conceded that the 520ST was assembled in Taiwan. But he said more than 75 percent of the parts were made in the United States and then shipped to Taiwan.

Cheifet asked for more information about the actual cost of building the ST. Jack said the assembly of the computer reflected about 2 percent of total price. Cheifet then asked Jack if his ability to guess where prices were going marked the difference between a successful product launch and companies like Coleco and Texas Instruments, which had recently exited the low-cost computer market. Jack noted that Coleco was a successful toy company, but it had failed by trying to apply that same technology to computers.

Kildall followed up, asking if where the computers were sold made a difference. Commodore famously sold the C64 in Kmart. Was that a good place to sell a computer? Jack noted that Kmart was a department store that sold a lot of high-end video and sound equipment. He believed that Atari's customers were sophisticated enough to know the value of what they were getting–and they would try to get the best price at any retailer.

Kildall asked Jack if he planned to market the 520 ST as a business machine and if that would make sense if the computers were sold at Kmart. Jack retorted Atari was building computers for "personal use." That's why it was called a personal computer. It was up to the individual where he wanted to use the machine. They could keep it in their home, their office, their lab, or anywhere else. He didn't dictate to the customer where they should use the computer.

Cheifet asked Leonard to demonstrate a color version of the 520ST that was in the studio. Leonard showed off the operating system–which was Digital Research's GEM graphical interface running on top of a custom kernel. (I've reproduced an image below using a modern Atari emulator.)



GEM, Graphics Environment Manager
TOS
ATARI
Copyright (c) 1985
ATARI CORP.
Digital Research, Inc.
All Rights Reserved.

An emulated version of the original Atari 520ST desktop environment. There is a green background with icons for the floppy disk drive and trash; a top-bar menu with options for Desk, File, View, and Options; and an open window displaying the following system information: “GEM, Graphics Environment Manager, TOS, Atari, Copyright 1985 Atari Corp., Digital Research, Inc., All Rights Reserved.”

Cheifet observed that practically speaking, the ST looked like a color version of the Macintosh 512K. Leonard agreed with that comparison. Cheifet asked about the price. Leonard said the 520ST with a monochrome display and a single disk drive would retail for $800.

Kildall asked Jack for a rough guess on how many 520ST units he expected to sell. Jack said the market was softer in 1985 than it was in 1984 but he still believed they would sell 1 million computers this year.

Kildall then asked about the availability of software for a low-cost computer like the ST. Jack said he wasn’t concerned. He noted that at Commodore, there was initially little software available for the C64, but when he resigned the company was selling 300,000 machines a month. By that point, the C64 had one of the largest software libraries on the market. Kildall noted that it took some time for the C64 to reach that point. Could the process be accelerated with the 520ST? Jack said he thought the process would go faster this time because there were now more software companies that were writing programs for the Macintosh. And it would be easy enough to port software from the Macintosh to the 520ST, as they both used the same Motorola 68000 microprocessor. Indeed, Jack said there would be around 25 to 30 major pieces of software available for the 520ST at launch.

Cheifet asked about the competition for the 520ST. Was it Apple? Was it the new Commodore 128? Jack said everybody was competition as far as he was concerned. But specifically for the ST line, the main competitor was Apple. He hadn’t seen the Commodore 128 yet so he couldn’t say anything about it.

Kildall asked about potential competition from Japanese computer manufacturers. As far as the Japanese were concerned, Jack said, he “was able to keep those people out of the U.S. market and almost the world market for the past seven years.” He pointed out the Japanese never bothered to enter the 8-bit computer market and he didn’t expect them to enter the 16-bit market either. Jack said the reason the Japanese had been able to successfully compete in other U.S. markets, such as automobiles, was that in those industries there were substantial profit margins that gave Japanese manufacturers an opportunity to come in with quality products and still undercut U.S. producers on price. Jack said his approach was to start out by focusing on the best quality for the lowest price, and in doing so keeping that type of competition out. Kildall agreed the C64 was definitely a computer that kept the Japanese machines out of the U.S. market.

Commodore’s New Three-in-One Computer…and Its Secret Project

Stewart Cheifet opened the final segment with a remote report from Commodore’s headquarters in West Chester, Pennsylvania. He noted that while Commodore had put more personal computers into homes than anyone else, sales were starting to level off industry-wide. This put pressure on Commodore to come up with something new–the Commodore 128 (C128).

Frank Leonardi, a Commodore vice president, spoke with Cheifet about the C128. He said this new computer had twice the capacity and the features of the C64 while remaining totally compatible with the older machine. Cheifet explained in voice over that the C128 could operate in three different modes. It came standard with 128 KB of memory and could jump between an 80-column or 40-column display. There was even a mode to run Digital Research's CP/M operating system.

Leonardi compared the C128 to the Apple IIc, the most recent revision to the Apple II line, which released a year earlier. He said the C128 had all of the same features and functions of the IIc, but because of Commodore's high-volume, mass production capacity, it could still make a reasonable profit by selling the C128 at half the price of Apple's machine.

Cheifet noted that if Commodore was able to lure away potential Apple buyers, it would mark a new kind of push into the already shaky personal computer market. But he added that the company once associated with action games and entry-level computers now had loftier goals, including a secretive project called "Amiga." Leonardi said the forthcoming Amiga computer would offer expanded capabilities in terms of graphics, animation, and telecommunications. Commodore planned to position the Amiga as a computer for higher education and high-end homes. Leonardi said the Amiga might not be able to replace the IBM in Fortune 1000 companies, but it would offer a compelling alternative to the Macintosh.

Cheifet said that many "industry observers" remained skeptical about Commodore's decision to enter the "mainstream" personal computer market, but Commodore itself was so confident that it planned to introduce a third new computer, a portable machine with a liquid-crystal display. The LCD machine would come with eight built-in programs, a modem, 32 KB of memory, and a 80-by-16 text display. Commodore had not yet set a price but said it would be "extremely competitive."

Leonardi told Cheifet he wasn't worried about personal computer sales leveling off. He said Commodore had yet to tap more than 15 percent of the market for microcomputers. Commodore had no viable competitors in the "mass market," he said, so now Commodore was looking towards opening up other channels to strengthen their position and capture more market share in the long haul.

Wrapping up the segment from Commodore's factory floor, Cheifet noted that one problem with buying a C64 or similar low-cost computer was the relative lack of support. Customers often purchased these machines at a discount retailer where the salesperson–if there was one–probably knew less about the computer than they did. For many low-end users, Cheifet said the solution to this lack of support was to join a user group. This led into a brief Robin Garthwait segment where she attended a meeting of the Marin Commodore Computer Club in

California. There’s really nothing worth noting from this segment–it was basically just snippets of conversations with people attending the meeting–so let’s move back to the studio.

Atari Would Sell ST to “Whoever Has Money”

The round table with Jack and Leonard Tramiel continued. With respect to user groups, Gary Kildall said they were often associated with lower-quality software on the C64. Did the Tramiels think that was true? And did a low-cost computer need “good quality” software to be successful? Jack said he believed the software had to be good stuff. The consumer was more sophisticated today. They’d seen and understood more when it came to computers. Indeed, many people today now had computers in their hands for the past eight years, dating back to when Commodore launched the PET. Consequently, these users were now demanding more.

Cheifet asked where Atari planned to sell the 520ST. He noted there was industry criticism when Tramiel decided to sell the Commodore 64 in Toys “R” Us and Kmart stores. Given the ST was a more sophisticated machine, what was Tramiel’s sales strategy going forward? Jack said that “whoever has money will be able to sell” the 520ST. He was looking for a very broad distribution. Specialized computer retailers served a certain purpose. They held the hands of business people and others who didn’t know how to operate a computer. But Atari was selling the ST to people who had knowledge–to the youth, as Jack put it. (Actually, he said “yute” like Joe Pesci in *My Cousin Vinny*.) Basically, anyone between the ages of 6 and 26 who were trained in school and were not strangers to computing. For that reason, Jack said the ST could be sold almost anywhere.

Kildall asked if there would be special training programs for retailers, like the store clerks in Kmart, who would be selling the machine. Jack said there would be training for both the people selling and buying the machine. The goal was to include programs on floppy disk that could be read right off the ST. Ideally, the computer would actually teach the owner how to use it.

Kildall asked Jack if he saw any difference between marketing computers for the home as opposed to business. And how would Atari make the ST successful in the home market? Jack replied the 520ST was a stronger product than the current IBM PC that was used in offices. By getting the ST into the hands of the yute (youth), they would grow up and hopefully buy Atari machines for the office in the future.

Kildall ended by asking if that meant Atari would focus on the educational market? Jack said there was no question that education was a very important market. He said Atari would have a number of different programs to market the ST to the schools. The ST was the future of the computing business–and it was important to teach the kids on today's computers, not yesterday's computers.

Would Atari Overtake Apple?

Paul Schindler's closing commentary was essentially a commercial for Atari. He said the 520ST had the "potential to be the most exciting thing that's happened to the computer since the Macintosh." Jack Tramiel was the man who revolutionized the home computer–and Schindler believed Tramiel would do the same for the office. Things had been calm in the business PC market since IBM came in and set the price-performance standard. But Atari was now set to upset everyone's apple cart with "more bang for less buck" than had ever been seen in the business computer market. And once Atari blasted through the business market, Schindler said the home market would be next.

And while IBM deserved to have its position in the market challenged, Schindler feared it would be Apple that would be most likely hurt by Atari's ascendance.

Atari, Lotus Delay Product Releases While Apple Ends Employee Massage Perk

Stewart Cheifet presented "Random Access" for this episode, which took place in April 1985.

- A favorite recurring "Random Access" item: The IRS was still having computer trouble. This time, Cheifet said that ongoing software problems with the agency's new $100 million computer system meant 10 million tax refunds were now behind schedule. But the good news was that if a taxpayer did not receive their refund by June, then the government would owe *them* interest.
- New Jersey's Department of Criminal Justice was now using computers to help track down "welfare abuse." Cheifet said convictions for welfare fraud in the Garden State had tripled since the new system was put in place, recovering almost $4 million for the state.
- In Reading, Pennsylvania, the U.S. Department of Agriculture launched an experimental program to replace traditional food stamps with new plastic

cards that could be read by computers at grocery stores. The USDA said the system could save the government hundreds of millions of dollars per year.

- Lotus Development Corporation, the makers of *Lotus 1-2-3*, reached an agreement to buy Software Arts, the company behind VisiCalc.
- The 10th West Coast Computer Faire drew nearly 50,000 attendees. Cheifet said the most talked about item at the event was Covox's *Voice Master*, which could translate human singing into musical notation.
- Cheifet also noted two other recent computer expos, Atlanta Softcon and the first Japanese COMDEX show. At COMDEX, Sony showed off its newest CD-ROM prototype, including a write-once disc system. There was also a "software on a credit card," that used embedded ROM chips on a plastic card, so a user could carry an entire box of business software in their wallet.
- Paul Schindler provided his weekly software review, an integrated software package called *Ability*. Schindler approved of the software's "nitwit simple" graphics package and lack of copy protection.
- In other Lotus news, the *Lotus Jazz* package for the Macintosh was delayed and now expected to ship at the end of May 1985. Meanwhile, the main subject of this episode, the Atari 520ST, would not be out this month as promised. Atari was now targeting a summer 1985 release.
- Cheifet said that according to a recent study, the average IBM PC owner purchased over $1,300 in software during their first use of ownership. At the other end of the market, another study from a New York-based research firm said that 1.5 million low-cost computers were thrown in the trash each year.
- The Holiday Inn Crowne Plaza chain said it would be putting AT&T 6300 computers in 10 of its hotels. Customers could use the computers for $30 per day.
- Stoneware, Inc., said it was dropping copy protection from its database program *DB Master*.
- As part of company-wide cutbacks, Apple said it would no longer offer free massages for members of the Macintosh team.

Atari's Rush to Bring the ST to Market

If the Apple Macintosh was the most over-hyped personal computer of 1984, the Atari 520ST would win that same award for 1985. Indeed, the media's description of the ST as the "Jackintosh" seemed to reflect a certain degree of media restlessness with Apple, as reflected in Paul Schindler's comments, and the belief that Jack Tramiel would be able to easily replicate his prior success at Commodore with Atari.

It didn't quite go that way. The ST was certainly not a failure in, say, the Mattel Aquarius sense. Indeed, Atari would go on to produce computers in the ST line for the next eight years or so. But Jack's on-air prediction of 1 million units in the first year was pure hype. Actual initial sales were closer to 50,000.

One thing you don't quite get from watching this *Chronicles* episode–and this may be partly because Gary Kildall's company was involved in the product–was a sense of just how quickly Tramiel rushed the 520ST to market. Warner Communications made its deal with Tramiel to dump the Atari, Inc., assets in July 1984. Atari Corporation started shipping 520ST machines in July 1985, just one year later.

Indeed, when *Byte* first reviewed the 520ST in its January 1986 issue, it wasn't even a review–it was "product description." The prototype that Atari had sent out for review was incomplete. Specifically, *Byte* noted, "Atari has not yet completed its BASIC interpreter, and the operating system, TOS, remains unfinished." As for what *Byte* did receive, the desktop was "less effective than the Macintosh's, the keyboard has an awkward feel, and the current operating system makes it impossible to switch between high-resolution monochrome and low- or medium-resolution color without installing the other monitor and rebooting."

Still, *Byte* said that even this unfinished 520ST left a "very favorable impression," given that it offered the power of a Motorola 68000 microprocessor at a "most reasonable price." Several months later, the final *Byte* review by Eric Jensen concluded the ST was a "very appealing machine in need of some further software development."

Those software issues largely revolved around the operating system. Unlike Apple, which had spent years internally developing a custom system and user interface for what became the Macintosh, Jack Tramiel was the type of executive who wouldn't pay to develop in-house what he could buy cheaply from someone else. As tech historian Jimmy Maher noted on his blog *The Digital Antiquarian*, Tramiel turned to Digital Research to build the system software for the ST "because they were willing to license both GEM and a CP/M layer to run underneath it fairly cheap."

But the finished product did not actually run CP/M, as it was incompatible with the Motorola 68000. Instead, Atari programmers went to Digital Research and, as Maher described it, "managed in a scant few months to port enough of CP/M and GEM to the ST to give Atari something to show on the five prototype machines that Tramiel unveiled at [the winter Consumer Electronics Show] in Las Vegas that January [1985].” That CES demonstration, in turn, helped fuel all the “Jackintosh” hype leading into Jack’s *Chronicles* appearance a couple of months later.

In retrospect, Tramiel’s decision to tie the ST to Digital Research–a software company that was clearly in decline even by this point–was just one of many factors that kept the ST from being the “Apple-killer” that pundits like Paul Schindler predicted. The 520ST and its successors did establish a niche market as a gaming machine–and later in music production, thanks to an included MIDI port–but by 1990, Atari’s share of the personal computer market hovered around 3 percent, according to *Ars Technica*. That was just half of Apple’s share and not even a drop in the bucket when compared to the 84 percent of market then held by IBM PC clones running MS-DOS and Microsoft Windows.

I would also point to two other events in 1985 that likely crippled Atari’s plans for long-term success with the ST. The first was the release of Aldus’ *Pagemaker 1.0* for the Macintosh in July 1985. Unlike the ill-fated *Lotus Jazz, Pagemaker* proved to be the Macintosh platform’s first “killer app.” Apple may not have been able to challenge IBM in the business market, but *Pagemaker* helped establish it as the standard for desktop publishing. This solidified Apple’s position in the mid-range market.

Meanwhile, in October 1985, Nintendo of America began the first sales of the Nintendo Entertainment System (NES)–ironically, an 8-bit console based on the same 6502 microprocessor produced by Commodore’s MOS Technology–in a test run in New York City. The NES went on to sell over 30 million units in North America. In doing so, it effectively obliterated what was left of the market for low-end, non-IBM compatibles like the Atari ST. (Keep in mind, Atari would continue to produce home video game consoles under Tramiel, including the Atari 7800 and the Atari Jaguar.) To add insult to injury, Jack Tramiel’s Atari would later file an antitrust lawsuit against Nintendo, alleging its business practices amounted to illegal monopolization. In 1992, a San Francisco jury returned a verdict in favor of Nintendo.

Commodore’s Post-Tramiel Transition Struggles

Commodore struggled to move beyond its successful 8-bit products, in large part because Jack Tramiel had failed to invest in new technologies as CEO. After Tramiel’s departure in January 1984, Commodore Chairman Irving Gould brought in Marshall F. Smith, a former steel industry executive, as CEO.

According to a 2007 article by Jeremy Reimer for *Ars Technica*, Smith abruptly canceled the LCD portable computer project mentioned in this episode even though the product was poised to be a big hit:

> Commodore took orders for 15,000 units of the machine just at the [1985 Winter Consumer Electronics Show] itself, and it looked like it would be a smash success. That was when the CEO of Tandy/Radio Shack took Marshall Smith aside and told him that there was no money in LCD computers. Smith not only canceled the machine, but sold off Commodore's entire LCD development and manufacturing division, based solely on this dubious "advice" from his competition! Commodore had a chance to take an early lead in the emerging market of portable computers. Instead, the company would never produce a laptop again.

Smith was soon replaced by another new CEO, Thomas Rattigan, who decided to focus all of Commodore's efforts on its Amiga division. The Amiga is referred to in this *Chronicles* episode as a "secret" project. Amiga started out as its own company, which had actually been founded by a disgruntled Atari, Inc., engineer back in 1982. I'll delve more into Amiga in a future post, but suffice to say the company actually became the target of a protracted legal battle between Commodore and Tramiel's Atari Corporation. Commodore acquired Amiga outright in 1984 and released the first Amiga-branded computer, the Amiga 1000, in July 1985.

As for the Commodore 128, it was effectively the last hurrah for the low-end 8-bit microcomputer market. It was designed as a dual home/office computer, as it could run the full library of existing Commodore 64 software, while a separate Z80 microprocessor enabled the C128 to run CP/M software. But as I noted above, CP/M was already in an irreversible decline by mid-1985, so it's unlikely many people bought a C128 to use it as an office machine.

As Frank Leonardi's comments to Stewart Cheifet suggested, the C128's real value to Commodore was that it provided a transitional product to complete with the Apple IIc. Launched in 1984, the IIc basically took Steve Wozniak's classic Apple II architecture and suffocated it inside of a Steve Jobs design. The result was somewhat underwhelming and Apple continued to sell far more of its earlier IIe product. For its part, the C128 went on to sell about 4 million units, less than one-quarter of the C64's lifetime sales.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of April 30, 1985.
- Jack Tramiel passed away on April 8, 2012, at the age of 83. He retired from the computer industry after selling Atari Corporation in the mid-1990s and later became involved with the United States Holocaust Memorial Museum.
- Leonard Tramiel also retired from the computer industry after the demise of Atari Corporation. Since the mid-1990s, he's focused on promoting science education and has even served as a volunteer eighth-grade astronomy teacher.
- The Atari name is still in use today by Atari SA, a French holding company. This Atari can trace its roots back to Jack Tramiel's Atari Corporation. Meanwhile, the Atari Games, Inc., created by Warner Communications following the 1984 split became defunct in 2003 after changing ownership several more times. If you want to hear the entire saga of the Atari brand name, I recommend episode 32 of *They Create Worlds*, a video game history podcast presented by Alex Smith and Jeff Daum.
- Frank Leonardi remained with Commodore as executive vice president of its business division until 1988. He would later serve as president and chief operating officer of Cardinal Technologies during the mid-1990s. Since 2002, Leonardi has owned and operated a real estate brokerage in California.
- The Atlantic Acceptance scandal that nearly killed Commodore back in its days as a Canadian corporation spawned one of the most comprehensive investigations in that country's history. The final report, prepared by an Ontario judge, spanned four volumes and over 3,000 pages. You can find a portion of that report at the Internet Archive. There's also a decent attempt at explaining Tramiel's role in the scandal in a post by an individual identified as Zube, which is archived at the Wayback Machine.

Chapter 14: MSX and COMDEX in Japan ’85

As we round the home stretch for the second season of *Computer Chronicles*, the show makes its first extended foray abroad. The next two episodes focus on Japan. This first episode from May 1985 examines the state of the Japanese personal computer market, while the second looks mostly at the country’s robotics industry.

Had Japan’s Window of Opportunity Closed?

Stewart Cheifet presented his cold open from Japantown in San Francisco. He said that while many Japanese products had become popular in the United States, one export that had not been very successful was the Japanese computer. This episode would explore why that was the case.

In the studio, Cheifet asked Gary Kildall if the window of opportunity for Japanese computer manufacturers to “invade” the U.S. market had closed or was it still possible they could move in. Kildall noted they were talking about packaged personal computers, as opposed to other areas related to computing where the Japanese were successful. That said, the Japanese manufacturers tended to focus on their home market first. They didn’t have the distribution, marketing, and support channels in the United States to sell personal computers. The potential was there, Kildall said, but American manufacturers were hoping to keep the Japanese offshore through their own ingenuity.

Japanese Computer Manufacturers Were “Waiting and Watching”

Robin Garthwait narrated some lovely B-roll footage on Japan’s history in the personal electronics market. She said that when the first Japanese transistor radio appeared on the market in 1955, few people at the time realized it was the start of the “Japanese economic miracle.” From radios to stereos, from cars to cameras, the Japanese had marked success in one market after another around the world.

Garthwait said Japanese technical proficiency was renowned and the country’s professional base seemed geared towards high tech. On a *per capita* basis, Japan had four times as many engineers as the United States. But in spite of the country’s dominant position in consumer electronics, the Japanese had not done so well with computers–at least those manufactured for export. Japanese computer companies owned about 10 percent of the world market, while the United States had 80 percent. And within the United States, which accounted for over half of the global computer market, Japan held only a 2 percent market share.

But, Garthwait pointed out, the Japanese had excelled in producing components, hardware, and peripherals, which didn’t require software development or extensive customer support. With some exceptions, Japanese manufacturers were content to leave systems integration and service to domestic affiliates. Like the early years of Toyotas and Datsuns, however, the Japanese had learned since their first attempts and their more recent approach to home computer exports seemed to be one of “waiting and watching.”

Could MSX Be the Answer?

Rather than go into the usual studio round table, the next segment featured Stewart Cheifet on location in Japan, where he interviewed a number of people associated with the Japanese computer industry. Standing in front of a Japanese computer store, Cheifet noted that Japan was the world’s second-largest computer market. More than $24 billion worth of computers had been sold in the country. But the world’s largest market was the United States–more than four times the size of the Japanese market. So no matter how successful a Japanese computer manufacturer was in the domestic market, Cheifet said the temptation was irresistible to want to sell Japanese computers in the United States.

Katsuro Miyakoda, an editor with the Japanese computer magazine *I/O,* told Cheifet through a translator that most Japanese computers were not based on the IBM PC, which was the *de facto* standard in the United States. Instead, Japanese computer manufacturers were struggling to make special machines for export to the United States, which were different from the computers they sold in Japan. He said there were two major problems Japanese companies needed to resolve in developing machines for export: poor documentation and a weak user interface.

Cheifet said the distinct difference between Japanese and American computer users had not been overlooked by the Japanese makers and could be seen in any Japanese computer store. The Japanese retailers had seen a profusion of low-cost machines attracting young customers, and the "accent" was definitely on entertainment software. Yukio Mizuno, a senior managing director with electronics manufacturer NEC Corporation, told Cheifet that the Japanese computer industry was in the process of transitioning from the hobbyist market to the business-oriented market. The personal computer market in the United States had already made this transition.

Cheifet noted that NEC was the "IBM of Japan," with a 58 percent share of the domestic market. But like most Japanese manufacturers, NEC had seen disappointing sales in the United States. NEC seemed to be waiting for improvements, particularly in the home computer market. Mizuno said that NEC had tried selling personal computers to the home market in Japan. However, the current software and processors were not sufficient for home use. But the home market would gradually increase over the next 5 to 10 years.

Katsuro Miyakoda added that for Japanese computers to sell in the United States, they needed some unique new software. That meant finding good third-party developers. Japanese makers also needed to find retailers to sell their own software. He suggested the reason NEC and other Japanese companies were not pushing harder in the United States was that they were not ready yet. They were saving their strength for the future.

Cheifet said that Japanese industry had a firm tradition of introducing new products in the domestic market first. Only after Japanese consumers responded favorably would the product then go overseas. But the computer was a special case. Kazuhiko Nishi, the co-founder of Tokyo-based ASCII Corporation, told Cheifet that transplanting Japanese-built software to the American market–especially applications–was very hard. There was also no established technology for writing operating systems or communications software not in Japanese. Nishi said the core problem was that it was "impossible" to ask Japanese engineers to speak English–and the computer was invented in the United States.

Cheifet said that of all the new Japanese computer products, the most closely watched was MSX, which ASCII Corporation co-developed with Microsoft Corporation in the United States. (Nishi previously worked at Microsoft.) MSX was an 8-bit operating system aimed at the home market and designed to solve the problem of incompatible machines. So no matter who manufactured the computer, if it ran on MSX, it would run any software written for MSX–an admirable concept, Cheifet observed, with its share of problems.

I/O magazine's Miyakoda noted that in Tokyo, MSX machines were sold at discount prices. This wasn't because the product was popular, but rather because MSX was not that successful. Like inexpensive computers in the United States, it was a "loser's game." The MSX machines had weak business capabilities, Miyakoda said, as they lacked disk drives and had limited memory storage and poor screen resolution–all of which were below U.S. personal computer standards. Conversely, Nishi said MSX would be important for the Japanese computer industry because it provided for a "very clear separation" between software and hardware.

Cheifet explained that MSX was a "hybrid" of eastern and western technology. Although made in Japan, it was designed in the United States. And while MSX remained an unknown, it represented Japan's unconventional approach to a routine obstacle in the computer industry–compatibility. Miaykoda said that if the Japanese manufacturers made machines to the IBM standard, it would just lead to a price war. It would not improve anything. Instead, the Japanese companies were trying to produce machines with higher standards and a higher level of functionality. The bigger the gap between Japanese and American computers, he said, the better the opportunities for new Japanese-made machines.

NEC’s Mizuno added that the compatibility problem worked both ways–it was equally difficult for IBM-based machines to gain a foothold in Japan due to the differences in the Japanese and English alphabets. Cheifet said that faced with this language obstacle, an uncertain market, and cutthroat competition, the Japanese companies were striking out in all directions to get a jump on new computer technology.

First Japan COMDEX Features Early Clamshell Laptop and Smart Watch

Cheifet transitioned his narration to B-roll footage of the first COMDEX in Japan show, which took place in late March 1985. He said the products displayed ranged from the very clever (small robots) to the very advanced (CD-ROM), with an emphasis on Asian applications. Fujitsu displayed their new Japanese- and Thai-language word processors. Cheifet noted that before computers, there was no practical way to type the thousands of characters called *kanji* in the Japanese language. To deal with the complexity, different systems had been adopted. For example, one program recognized the corners of the character, which was chosen by the user on a keyboard. Another company, CICS, had done away with the keyboard completely, with a “hand writer” that treated kanji as graphics. The user entered the characters on a digitizing pad, which the software then interpreted using a software dictionary.

Fujitsu also showed off a new portable 16-bit computer with an 80-by-25 display. The machine came standard with 128 KB of memory–expandable to 448 KB–and up to 512 KB of ROM. Cheifet said the Fujitsu machines would be priced starting around $1,300. Another “unusual” portable on display was the Ampere WS 1, which featured a “bizarre clamshell case” hiding a full-sized screen and a Motorola 68000 chip. The operating system was based on APL, a programming language developed in the early 1960s for scientific applications.

Ampere WS-20

But Cheifet said the “most compact machine” at the show was the Epson RC-20 Wrist Computer, a watch-sized computer-on-a-chip with a communications port, 2 KB of RAM, and four built-in programs. COMDEX also featured a number of advanced computer peripherals, notably the 540 MB CD-ROM discs displayed by Denon and Sony. Sony also displayed a larger-sized laserdisc with a capacity of 3.28 GB–or about 30,000 pages of text.

Seiko Epson RC-20 Wrist Computer

Foreign language instruction applications were also a big item at COMDEX, Cheifet said, including a “computerized mystery story” published by the Limelight Company. The program used an audio cassette synchronized with the screen’s graphics, providing a “complete audiovisual language lesson.”

Hitachi Aimed to Be World’s Top Computer Company by 2000

The final segment returned to the California studio for a round table. Gary Kildall opened by noting there were a lot of foreign manufacturers that would like to bring computers to the United States, but it was really the Japanese challenge that domestic manufacturers were concerned about. To discuss this “challenge,” Michael Miller and Christopher Mead joined Kildall and Cheifet.

Kildall asked Mead, publisher of the Phoenix-based *Japan High Tech Review*, why Japanese computers like the Sharp X1 or MSX had yet to be introduced in the United States. Mead said the basic reason was language. Japanese kanji needed to be represented graphically and thus required more computing power than the western alphabet. Until about a year ago, Mead said it was effectively impossible to represent the Japanese alphabet on personal computers. This kept Japanese companies far behind the American industry.

Kildall followed up by asking about Japan's domestic market. Were Japanese computer makers simply looking to establish their success at home before coming to the United States? Mead said that had been true with many Japanese companies. Their attitude was you didn't want to embarrass yourself outside before you fist perfected your product at home. Mead added there was also a language problem on the English side, as when it came to software it was important to speak the same language as your customers. Kildall pointed out this problem also extended to translating manuals and documentation.

Kildall then turned to Miller, the west coast editor for *Popular Computing*–the presenting sponsor of *Chronicles* this season–and asked about MSX. Kildall said that was a standard that could compete with a machine like the Commodore 64 or the Atari 8-bit machines. Were those two American companies keeping MSX out of the American market? Miller explained that MSX was a standard that would in theory be adhered to by a number of Japanese companies. Many of these machines were shown at the 1985 Winter Consumer Electronics Show and already on sale in Japan. But as of yet, Mead said nobody had successfully brought an MSX machine to market in the United States. It seemed to Miller that the MSX computers were not as up-to-date when compared to the newer Commodore and Atari machines.

Kildall asked if the Japanese had any potential advantage in terms of manufacturing, especially given that many computer parts were already produced in Asian countries. Miller concurred that most American manufacturers, including Commodore and Atari, relied on components built in either Japan or South Korea.

Cheifet asked Mead if the Japanese had actually solved the language problem and would now pose a greater challenge to American computer manufacturers in the future. Mead said it depended on what you meant by "the future." He didn't see any immediate changes in the U.S. market over the next six months. It was more of a long-term problem. For example, Hitachi had an internal goal of becoming the world's number-one computer company. The first step towards that was becoming the world's number-one semiconductor manufacturer. Mead said Hitachi hoped to reach this first goal by 1990. Then Hitachi hoped to pass IBM to become number one in computers by 2000.

Cheifet closed by asking about computer peripherals, a market where Japanese companies had been very successful in the American market. Why was that? Mead replied the language barrier was less of an issue there. And many American designers were deciding that since the products would eventually be produced in Japan anyway, they might as well go directly to the source when creating new products.

America's "Secret Weapon" in the Computer Wars

Paul Schindler's closing commentary argued that Silicon Valley was unlikely to go the way of Detroit or Pittsburgh when it came to dealing with a potential Japanese "invasion" in the computer market. While the Japanese knew how to both "innovate" and "imitate," Schindler said American industry had its own "secret weapon" that may never be overcome–the United States was a keyboard society. Japan was not. In other words, the previously discussed language barrier would prove too much for Japanese manufacturers to overcome.

Attack of the AT Clones

Stewart Cheifet presented "Random Access," which dates the episode in early May 1985.

- There was a new round of IBM PC/AT clones heading to the market. Compaq announced both a desktop and a portable that were AT-compatible. Compaq said its desktop model was 30 percent faster than the IBM. NCR also announced the PC8, an AT clone that could serve up to 16 users. The Compaq and NCR clones both relied on the Intel 80286 microprocessor, the same used in the IBM PC/AT.

- There were also rumors that Tandy and Hewlett-Packard were preparing their own AT clones. The Tandy machine would possibly be shown at the forthcoming Atlanta COMDEX show.
- AT&T said it would begin selling its own 32-bit UNIX-based microprocessor as part of its efforts to expand the use of its UNIX operating system. Meanwhile, Xerox said its new computers would be AT&T-compatible, meaning Ethernet and AT&T's StarLAN networking standards would work interchangeably.
- Apple formally announced the end of the Lisa, which had been re-branded as the Macintosh XL. Cheifet noted the Lisa had never been successful, and Apple had cut the price from its original $10,000 to under $4,000. Apple said it would focus on making more "Big Macs" in the future.
- For all the talk in this episode about the future of Japanese computer exports, Cheifet said Japanese companies were actually investing heavily in Silicon Valley itself. For example, Fujitsu was now a major investor in mainframe manufacturer Amdahl Corporation. Overall, Japanese corporations now owned or controlled about 140 industrial plants in California.
- Paul Schindler presented his weekly software review, this time for *Copy II PC* (Central Point Software, $50), a utility that allows users to make backup copies of otherwise copy-protected software to a hard disk drive. Schindler said he used the program to copy *dBase III* to his hard drive. And while he acknowledged people could use *Copy II PC* illegally, the same was true of a butter knife. That didn't mean we should ban butter knives, Schindler said.
- Cheifet said there was a growing trend of "mini" versions of best-selling business programs. For example, MicroPro planned to release a mini *WordStar* that would sell for half the price of the full version.
- Computers in schools were booming. The number of computers in schools increased by 75 percent in 1984, Cheifet said. Nearly 300,000 computers were purchased by schools that year. More than 85 percent of public schools reported using computers, with the average school having eight machines.

- People Express Airlines had a new computerized reservation system that allowed customers to purchase tickets using a touch-tone telephone.
- IBM released the first “talking, blinking” ad in print. Big Blue took out an ad in a recent issue of the French magazine *Le Point* that featured an embedded microprocessor, battery, and speaker, that caused the Charlie Chaplin-themed ad to light up and play Christmas music when the page was turned. Cheifet said IBM paid $2 per issue for the computerized ad. The magazine sold 300,000 copies of the issue on its first day.

What Was MSX?

The MSX standard had been mentioned in a number of previous *Chronicles* episodes before one of its developers, Kazuhiko “Kay” Nishi, appeared on-camera in this program. So what exactly was MSX? And why have you probably never seen an actual MSX machine?

Basically, MSX was a computer architecture based on the Zilog Z80 microprocessor. The Z80 was hardly new or innovative technology even in 1985. Z80-based machines had been on the market since the late 1970s, and in fact were commonly used in microcomputers running Gary Kildall’s CP/M operating system, such as the Osborne I and KayPro II. At the lower end, the Z80 powered the original Radio Shack TRS-80.

As the MSX Resource Center explains, the MSX standard was an attempt to create “a hybrid of a videogame console and a generic CP/M-80 machine.” There’s some debate over the origin of the name “MSX.” One theory is that it stood for “Microsoft Extended BASIC,” which was the software designed by Microsoft to use with the standard. Nishi himself would claim in the 1990s it stood for “Matsushita Sony X-machine.” with the “X” representing whatever company happened to make a particular computer based on the standard.

While MSX machines did enjoy success in much of the world, they never gained a foothold in the United States. Indeed, the MSX Resource Center said the only machines that made it to the American market were “an early

SpectraVideo model and the Yamaha CX-5M, which while essentially an MSX, was marketed as a musical instrument rather than a home computer.”

Nishi Clashed with Gates Over Giant Brontosaurus

Kay Nishi himself had a background in publishing. He co-founded ASCII Corporation in 1977, which published a magazine called *ASCII*. Nishi would then strike a licensing deal with Bill Gates to sell Microsoft BASIC in Japan in 1978. Eventually, Nishi became Microsoft’s vice president of sales in Asia. This relationship led to the development of MSX.

But that relationship later soured. According to a May 1993 *Wired* profile of Nishi written by Bob Johstone, even as Microsoft sales in Japan soared, “Gates became increasingly impatient with Nishi’s unorthodox approach to business.” The Microsoft CEO was particularly irked when Nishi decided to promote MSX with a $1 million publicity stunt “involving a life-size model of a brontosaurus.” By 1986, the Microsoft-ASCII partnership was dissolved.

Despite this blow, Nishi took ASCII public three years later, in 1989. Nishi also went on a buying spree. Johnstone noted that ASCII corporation entered a “slew of new businesses” during this time, buying everything from a movie distributor to a travel agency and a helicopter rental company. By 1992, however, ASCII Corporation had accumulated $320 million in debts and its stock price was down to just $5 per share (after reaching a high of $175). In 1993, a consortium of Japanese banks bailed out ASCII Corporation.

ASCII Corporation would continue to operate under a number of different owners until April 2008, when the original publishing business was absorbed into another publisher called MediaWorks. The new company, ASCII Media Works, continues today as a subsidiary of Kadokawa Group Holdings, Inc.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of May 21, 1985.
- NEC’s Yukio Mizuno passed away in 2003 at the age of 73. According to the IPSJ Computer Museum, Mizuno was NEC’s top personal computer executive and helped to create the 16-bit PC-9801, which was popular in Japan’s business market.
- Michael Miller has had a long career in computer journalism. He left *Popular Computing* not long after his *Chronicles* appearance to join *InfoWorld,* where he served as executive editor and editor-in-chief. He moved to *PC Magazine* in 1991, where he served as editor-in-chief for 14 years. In 1997, he also became editorial director for the magazine’s parent company, Ziff Davis. After a brief stint as Ziff Davis’ Chief Content Officer, Miller joined the Ziff brothers’ private investment firm in 2006, where he eventually became Chief Information Officer.
- The MSX standard was formally discontinued in the early 1990s. But there have been a number of revival efforts, most recently MSXVR, a project that sells newly manufactured computers supposedly compatible with the original MSX standard.
- The Ampere WS 1 may have been the first clamshell-style laptop, beating Apple’s PowerBook G3 to market by about 15 years. But according to Old-Computers.com, the Ampere failed its FCC inspection and was thus never sold in the United States.
- Speaking of coming up with ideas that Apple later copied, the Seiko Epson RC-20 was the first true “smartwatch” in that it could run standalone programs. The watch had the same Z80 microprocessor used in the MSX standard.
- The end of the Apple Lisa would eventually lead to a mass burial of 2,700 machines in a Utah landfill sometime in September 1989, according to Tim Hall.
- For the record, Hitachi was not the world’s top-selling computer company by the year 2000. Compaq took that honor, at least according to Wikipedia. NEC was the only Japanese company to crack the top-five that year.
- As I pointed out in my post on the Atari 520ST, the real Japanese “invasion” came from video game consoles, notably the Nintendo Entertainment System and the Sega Genesis. The success of these purely video game systems–which didn’t require a keyboard at all–also

likely helped to squash any potential interest in the MSX standard in the United States.

Chapter 15: Tsukuba Expo ’85

In 1963, Japan’s government decided to build a planned scientific community about 35 miles north of Tokyo that would meet the country’s growing demand for high-tech research and technology. Known as Tsukuba Science City, the site today is home to roughly 150 research, educational, and high-tech business institutions. From March to October of 1985, Tsukuba also hosted a world’s fair called Expo ’85, which was the sole focus of our next *Computer Chronicles* episode.

Not Just a County Fair, Not Just a Europe Fair, But a World’s Fair!

This episode departed from the usual studio format. It consisted almost entirely of narration over footage of various exhibits at Expo ’85 with excerpts from interviews of two of the participants. Here are some of the highlights:

- Stewart Cheifet did his cold open from outside the Expo where Sony premiered its JumboTron video board, which he described as the “world’s largest television set” at nearly 14 stories high.
- Robotics was a major focus of the Japanese exhibitors. For example, Toshiba displayed its “multi-jointed top spinning robots,” which were touch sensitive and accompanied by an eight-jointed inspection arm equipped with 104 sensors and capable of 18 degrees of movement. It even had a camera to watch over the other robots!
- Fujitsu had its own “giant performing robot” called “FANUC MAN” that was 5 meters tall and weighed 25 tonnes. FANUC could build a miniature model of itself and also lift a 200 kilogram barbell.
- Fujitsu also displayed an “automatic multilingual news service,” which provided instant translation of English-language news feeds into French, German, and Japanese.
- Not to be outdone, NEC Corporation demonstrated its own voice recognition and reproduction system that promised simultaneous

translation of spoken words.
- The Soviet Union’s pavilion displayed a personal computer that featured voice recognition and translation. Bidniouk Sviatoslav of the Kiev Institute of Cybernetic Engineering explained through a translator that the machine synthesized several Indo-European languages and could understand 200 different commands. It could answer only to the voice of the operator.
- Italy’s pavilion had a “painting analyzer,” that could measure the layering of paint and determine if a given painting was genuine or a fake.
- France showed a model of its Minitel, a small computer terminal designed to link homes to computer databases. France was also one of the few non-Japanese exhibitors to display a robot.
- The West German and Japanese national telephone companies displayed their own respective multi-service communications terminals that promised the ability to transmit pictures over fiber-optic telephone lines.
- Japan Airlines sponsored a high-speed service or “bullet” train to transport people around the Expo site. The trains floated above the track on a magnetic cushion and could reach speeds approaching 300 km/hr.

Personal Robots by the Year 2000?

The next segment featured the work of Professor Ichiro Kato of Tokyo’s Waseda University, who was one of Japan’s foremost experts in robotics. There was an extended demonstration of Kato’s WABOT-2, a humanoid robot that could read a musical score and then play it on an electronic keyboard using five-fingered hands.

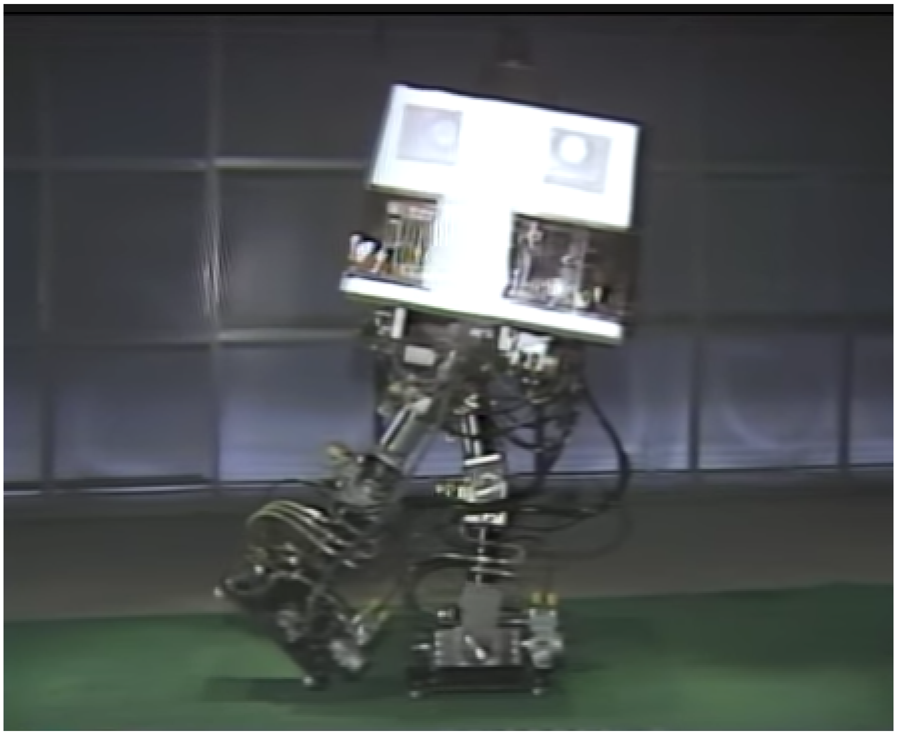
A human-shapred robot plays an electronic synthesizer keyboard.

Cheifet explained that Kato had been working on anthropomorphic robots for the past 20 years, starting with replacement parts for the human body. Kato believed that the “real era” of robots was fast approaching. Through a translator, he told Cheifet that in 20 years–the start of the 21st century–robots would be more than just factory machines. There would be personal robots for offices and homes. Current factory robots were not very flexible. To perform human tasks these future robots would have to resemble humans in both shape and action.

Cheifet noted that WABOT-2’s movement was controlled by 80 microprocessors arranged in a hierarchical manner similar to the human nervous system. Kato elaborated that the robot had 50 degrees of movement, more than any previous robot. Each joint contained a one-chip microcomputer. Fifty of these chips formed a software-servo system that took the place of hardware to obtain feedback. WABOT-2 was then made up of various sub-systems, including left and right arms and legs, as well as sound and vision.

While building a human-like robot to play a synthesizer might seem like an unnecessarily complicated way of using a computer to generate music, Cheifet said there was a reason for this “circuitous method.” Kato told him this was the best way to establish the basic technology for building 21st-century robots.

Another Kato design featured at the Expo, the Waseda Hitachi Leg 11 (WHL-11), was a walking biped robot that weighed 120 kilograms. Cheifet noted the robot required enormous strength just to move. Each of the WHL’s “hips” contained a hydraulic power source and a microcomputer.



A robot with a cubic head and four motorized limbs walking across a stage.

Kato also designed a four-legged walking robot that had the special ability to climb stairs. The professor said that since there were always three legs supporting the robot, it was a simple machine compared to the biped WHL-11. He noted that human beings had a similar evolution, from walking on four limbs to just two.

Cheifet said Kato believed that the personal robot was the next logical step after the family car and the personal computer. But there were some obstacles along the way. Kato said the advance of technology would accelerate and nothing would stop that. When it came to the society that would use that technology, however, individuals might not be able to change their consciousness as rapidly. If this gap became wide enough, Kato said, it would prove catastrophic. We must therefore find a way to change how people will react to the robots. Kato emphasized that robots were machines and not living beings, and it was important not to lose the distinction between the two.

Were Robots the Solution to America's Future Labor Shortage?

In his closing commentary, Paul Schindler said the Japanese were so far ahead of the United States when it came to robotics that it was hard for Americans "to see their dust." Schindler suggested this was due to Japan's labor shortage, which necessitated the quicker development of industrial robots. The United States would face a similar crisis, he added, when baby boomers like himself got older. So right now, the Japanese needed robots and America did not. But when the time came, the U.S. would "unleash that old-fashioned American know-how" and steal every robotic idea from Japan that "was not tied down." By the turn of the century, Schindler said we'd probably see Japanese newspapers talking about how America was "imitating, not innovating" when it came to robotics.

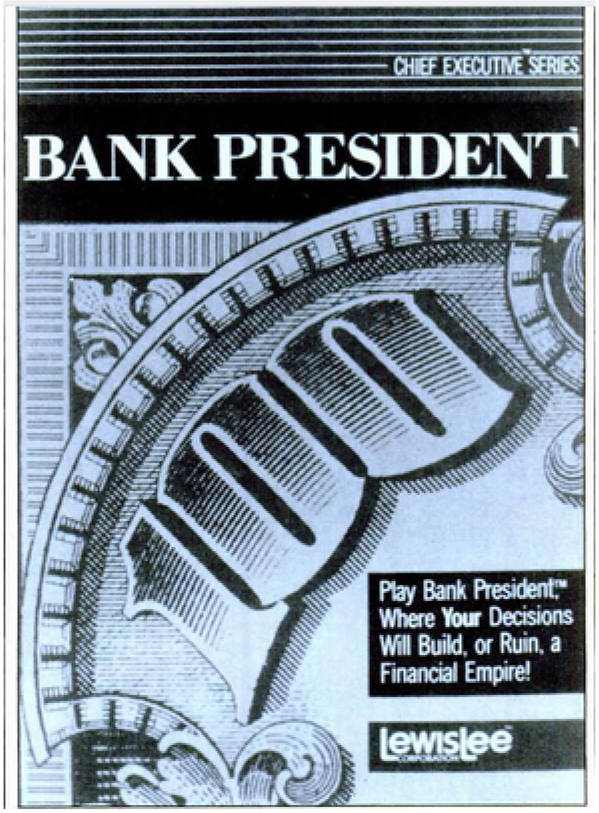
IBM Bundles Free Software as AT Clones Continue to Hit the Market

Stewart Cheifet presented this week's "Random Access," which is dated in early May 1985.

- IBM was now bundling free copies of its word processing and spreadsheet programs–plus *TopView*–with the IBM PC XT. Cheifet said software houses and dealers were crying foul, fearing that PC customers would no longer buy third-party software.
- IBM also ended its deal with Epson to make printers for its PC line. IBM planned to make its own low-cost printer called the Proprinter,

which would sell for $549 and run at three different speeds. IBM also introduced a color inkjet printer.

- For its part, Epson announced a new dot-matrix printer, the Homewriter, which was expected to sell for under $200.
- At the recently concluded spring COMDEX show in Atlanta, last-minute exhibitor Atari Corporation showed off the first production models of the 520ST.
- Zenith Data Systems announced its new PC-AT clone, the Zenith Z-200, which promised speeds of up to 30 percent faster than the IBM model. Cheifet noted there were now a number of AT clones on the market, including offerings from Compaq, Kaypro, and Texas Instruments, with Tandy and Hewlett-Packard expected to enter the fray soon.
- Two firms said they had developed new computers that could run parallel processing at speeds approaching that of a more expensive supercomputer. One of these machines, the BBN Butterfly, linked together 128 Motorola 68000 microprocessors to accomplish speeds of 60 million instructions per second. The other machine, the Connection, coupled 1,000 chips each containing 16 microprocessors to achieve speeds of 250 million instructions per second. Intel also said it would produce its own parallel processing computer that used 128 chips to run 100 million instructions per second.
- Paul Schindler presented his weekly software review, this time for *Bank President* (Lewis Lee Corp., $75), which he called “one of the most interesting yet strangest simulation games” he’d ever seen. As the name suggested, this was a simulator where you played the CEO of a bank. You could play against other humans or the computer. Schindler claimed the game was so addictive that at least “one major bank has banned it entirely.”


CHIEF EXECUTIVE SERIES
BANK PRESIDENT
100
Play Bank President, Where Your Decisions Will Build, or Ruin, a Financial Empire!
LewisLee CORPORATION

Box cover art for a 1985 software program called “BANK PRESIDENT” by Lewis Lee Corporation. The cover features a blown-up image of a $100 bill. The description says, “Play Bank President,’ Where Your Decisions Will Build, or Ruin, a Financial Empire!”

- Logical Business Systems announced a new add-on board for the IBM PC called *VoiceCommand* that promised voice recognition capabilities. Cheifet said the system had a vocabulary of 32,000 words and essentially turned any software program’s keyboard commands into spoken commands.
- Apple lowered its 1985 sales projections and acknowledged the layoffs of 75 workers, as well as the elimination of 1,500 part-time jobs.
- Blue Cross and Blue Shield of Maryland announced a new laser ID card for its health insurance customers. The card could carry up to 800 pages of medical history, including a record of past medical problems, digitized X-rays, and complete insurance information.
- General Motors was still deciding what state to build its new $3.5 billion plant in to manufacture the new Saturn car. GM said it would

turn the final decision over to the computer, although humans would intervene if the computer came up with a tie.

- Two hackers in Santa Cruz, California, said they developed a computer program that could “beat the house” at roulette by analyzing the friction characteristics of a particular wheel, resulting in a 44 percent advantage to the player.
- A poet, Michael Newman, developed a program called *The Poetry Processor*, which could help users write poetry by automatically analyzing meter, cadence, and alliteration. The software also contained a built-in rhyming dictionary.
- Going a step further, the developers of another new program called *RACTER* said their software could write its own books. The software had already been used to create its first book, *The Policeman’s Beard Is Half-Constructed*.

Expo Draws Over 20 Million During Six-Month Run

As I noted in the introduction, Expo ’85–formally the International Exhibition, Tsukuba Japan 1985–ran from March 17 to September 16, 1985. According to a report from the U.S. Department of State on the Expo, the final visitor count exceeded 20.3 million for the six-month period, which met the organizer’s goal of 20 million. A total of 47 countries and 37 international organizations participated in the Expo. The United States pavilion, which covered over 32,000 square feet, focused on artificial intelligence as its theme.

The only featured guest in this episode was Waseda University Professor Ichiro Kato, who passed away in 1994. More than a decade before the WABOT-2 made a splash at Expo ’85, Kato previously developed the WABOT-1 in 1972. According to Teckexperts.com, the WABOT-1 was the “world’s first full-scale humanoid ‘intelligent’ robot.”

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of May 14, 1985.
- Gary Kildall did not appear in this episode, and in fact there was no co-host as Stewart Cheifet only presented brief interstitial segments from the KCSM studio. Robin Garthwait also narrated a short B-roll segment introducing Science City and the Expo.
- Following its debut at Expo ‘85, The Sony JumboTron became an ubiquitous presence in sports stadiums. According to an article published by Frank Gatto and Associates, however, Sony was not the first to experiment with this type of large screen display: Mitsubishi actually debuted its own giant display at Los Angeles’ Dodger Stadium in 1980.
- Although Paul Schindler mentioned one bank forbidding its employees from playing *Bank President*, the program apparently was used as a training tool in the industry. A February 1986 *InfoWorld* article by Scott Mace reported that “Citibank personnel managers, credit managers, and auditors are using the simulation during four- and five-day training conferences to better understand how other parts of Citibank work.”
- General Motors would eventually build its Saturn plant in Spring Hill, Tennessee. GM produced Saturn vehicles at Spring Hill from 1990 to 2007. As of October 2020, GM said the Tennessee facility would be used to manufacture electric vehicles. A July 1985 report in the *Los Angeles Times* made no mention of GM using a computer to make the final site selection decision, and in fact the company “did not offer an in-depth explanation of why the giant automaker selected the Tennessee site over the hundreds of others it had studied.”
- Michael Newman’s *The Poetry Processor* and his *Newman’s Electronic Rhyming Dictionary* (N.E.R.D.) were apparently self-published as separate titles. Newman told the *Washington Post* in July 1987 that he had sold the rights to Activision. But a September 1988 *New York Times* article indicated Newman was selling the two programs himself via *The Paris Review*, where he was a contributing editor. This article said Newman had developed a third program, *Orpheus A-B-C*, which was a “poetry tutorial.” You could buy all three programs together from Newman for $190 plus $2 postage. In a February 1990 op-ed for the *Times*, Newman claimed that *Poetry*

Processor had “something like a 95 percent success rate at culling competent Shakespearean sonnets out of people who had never used the program and usually never written a poem, usually in an hour.”

- *The Policeman’s Beard Is Half-Constructed* was an actual book. More precisely, it was a collection of prose supposedly “generated” by the RACTER software. Bill Chamberlain and Thomas Etter were credited as the co-authors of RACTER. Leah Henrickson authored an extensive article in April 2021 on the history of *Policeman’s Beard*, RACTER, and its authors for *Electronic Book Review*.

Chapter 16: MacDraw, Dazzle Draw, the Magic Video Digitizer, and Lumena

When *Computer Chronicles* first delved into the topic of computer graphics back in April 1984, the focus was largely on high-end professional systems, such as the $150,000 Quantel Paintbox. More than a year later, in June 1985, *Chronicles* closed out its second season with another computer graphics show that looked at more affordable offerings for personal computer users.

Would Artists Abandon Paintbrushes for Graphics Pads?

Stewart Cheifet did his cold open at a California museum standing in front of what he described as “a fine example of abstract expressionist art” by artist Dan Cooper that was made using an Apple II. Cheifet quipped that old artists’ tools like brushes were becoming “passe” and replaced by touch-sensitive graphics pads and sophisticated graphics software.

In the studio, George Morrow of Morrow Designs joined Cheifet as co-host for this episode. Cheifet showed Morrow an Etch-a-Sketch toy, which Cheifet joked was the closest he ever got to “computer graphics” as a kid. Cheifet noted that a year or two earlier, people were merely talking about computer graphics, but now there was an explosion in the sales of graphics software. Why the change? Morrow replied there had been dramatic changes in the available hardware and software. The best example, he said, was the Macintosh, which made it much easier to create visual images without all the work that used to be required. And we were now seeing the same effect starting to move over into the IBM PC and compatibles world. Morrow thought this would change the way commercial artists worked over the next year or two.

Creating Physical Book Covers Digitally

Marking her final *Chronicles* episode, Robin Garthwait presented the first of two remote segments, this one profiling how a graphic artist, Inga Infante, used a computer in her work as a book cover illustrator. Garthwait noted the graphic artist ran her business based on creativity–turning ideas and concepts into visible form. Before computers, the tools for this transformation were based on ink, paint, or dye. Putting the line to a piece of paper meant committing the idea to a form.

Today, Garthwait continued, the computer's special ability to manipulate ideas gave the artist a new electronic flexibility. While artists like Infante still kept traditional tools in her studio, Garthwait said she had moved most of her art to the computer screen. The original design is drawn on a digitizing pad. Colors are then applied from a choice of palettes displayed in a corner on the screen. Infante no longer needs to make numerous copies of her design when submitting them for approval, Garthwait said, as now she could draw several copies on the screen and make transparencies of each. If the publisher wanted changes, Infante could recall the design from disk and make the change without affecting the rest of the artwork.

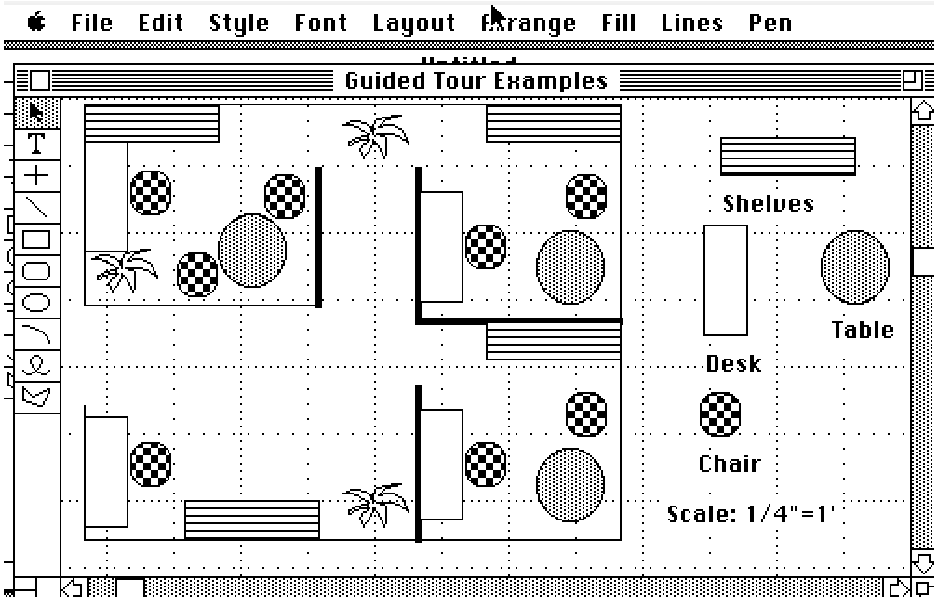
Garthwait noted that graphics packages were now available for a wide range of computers ranging from the Commodore VIC-20 to the newest supercomputers. But a sophisticated application didn't always mean a sophisticated price. For instance, Infante did her cover design work on a Zilog Z80-based computer with some external graphics support.

Perhaps the biggest advantage of computer design, Garthwait said, was the amount of time it saved. She noted Infante's book cover for Dale Peterson's *CoCo LOGO for the TRS-80 Color Computer* would have taken four times as long to design by hand as by computer.

Utilizing the Graphics Capabilities of the Macintosh

Marein Cremer and Mark Bulla joined Cheifet and Morrow for the first round table segment. Cremer, a product manager at Apple Computer, was there to demonstrate *MacDraw*, a vector graphics package for the Macintosh. Morrow asked Cremer how *MacDraw* differed from *MacPaint*. Cremer said the basic difference was that *MacDraw* had a "structured approach," which meant that each object was regarded as a separate entity, and once it was on screen it could be manipulated at any time. That made *MacDraw* attractive in the business environment for use in presentations. *MacDraw* was also useful in the technical area due to its ability to make precise, accurate drawings for things like architectural and engineering design.

Cheifet asked for a demonstration. Cremer used *MacDraw* to make a simple business organizational chart. She also showed how you could manipulate a sample office floor plan, which I've reproduced below using emulation of the original *MacDraw* software.



A sample office floor plan displayed in MacDraw for the Macintosh.

Cheifet then turned to Bulla, the director of technical services with New Image Tech, Inc., to demonstrate his company's product, the Magic image digitizer. Bulla explained that Magic took a video signal, cut it up into little pieces, assigned gray patterns to the levels of light, and placed a digitized image into a *MacPaint* file. Morrow asked about the practical use for such digitized images. Bulla said one use case would be placing pictures into a small company's newsletter.

Bulla demonstrated Magic by taking and digitizing an image of Morrow using what was basically a security camera attached to a Macintosh.

A demonstration of the Magic video digitizer. A woman and a man are sitting at a desk. On the desk, there is a small security camera mounted on a tripod hooked up to an original Apple Macintosh computer.

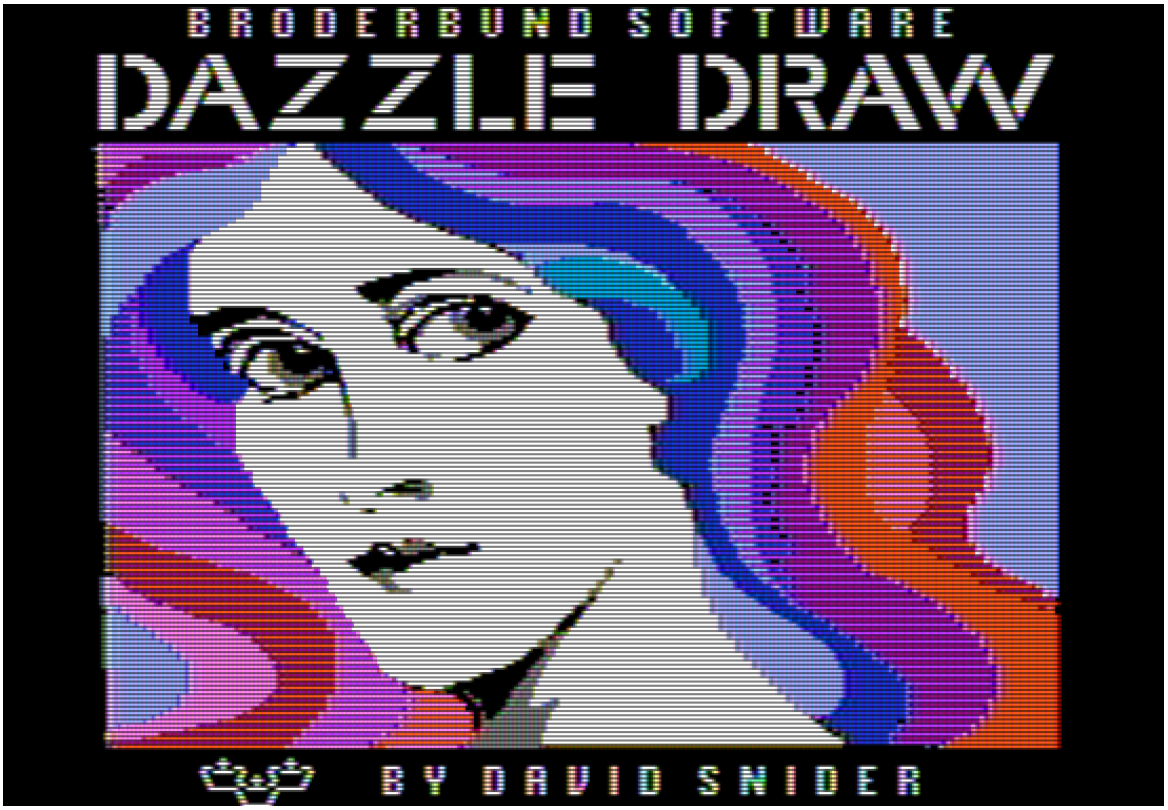
Morrow asked how much the system cost. Bulla said the digitizer itself, including the software and hardware, sold for $349. The camera was an inexpensive security camera that cost an additional $149. Morrow seemed impressed by the overall low cost–$500 for a digital imaging system–and said Bulla's company would have trouble keeping up with demand come Christmas. Bulla then showed some additional sample images from the Magic software, which displayed up to 38 levels of gray. Morrow remarked that as memory became cheaper, computers could store more complex images like these samples.

Cheifet asked if it was possible to manipulate images taken with the Magic system in the same way as objects used in *MacDraw*. Bulla said sure, you could manipulate Magic images in either *MacPaint* or *MacDraw*. Cheifet asked if it was possible to make a hard copy. Bulla said yes, you could print images out using a Hewlett-Packard or Apple laser printer.

Cheifet asked about the other practical uses of the Magic system, i.e., what would users really buy it for. Bulla replied there were a number of possible scientific applications, such as X-rays, that could make use of the software's ability to assign different patterns to different light intensities.

Mac-Like Capabilities on the Apple II

The second studio round table had Ed Bernstein and James Dowlen join Cheifet and Morrow. Bernstein was the director of product development for Brøderbund Software, which published *Dazzle Draw*, a graphics package for the Apple II computer line. Brøderbund was also known for publishing computer games. Morrow asked what influence the game software had on *Dazzle Draw*. Bernstein replied "quite a lot," noting that high-resolution screen graphics went hand-in-hand with the development of games. Bernstein noted that *Dazzle Draw* was designed by David Snider, himself a former game programmer.



The title screen for Broderbund Software's "Dazzle Draw" by David Snider, which featured a computer-generated image of a woman's face with wavy, multi-colored hair.

Beginning his demo, Bernstein explained that *Dazzle Draw* did what *MacPaint* did except in 16 colors and on an Apple II, which cost much less than the

Macintosh. Bernstein showed off a sample image of a butterfly that was included with the software.

An orange-and-black butterfly sitting on top of an orange flower with green leaves.

Morrow noted the *Dazzle Draw* interface was reminiscent of the menu-driven system used on *MacPaint*. Cheifet concurred, noting Bernstein was also using a mouse, similar to a Mac. Bernstein said Brøderbund made “no bones about” the fact they set out to make essentially a Mac-like for the Apple II.

Cheifet asked about the memory requirements for *Dazzle Draw*. Bernstein said it required 128 KB of memory. The Apple IIc came standard with that amount, but if you used a IIe it would require a 128 KB memory expansion card.

Cheifet noted there had been earlier drawing programs for the Apple II machines. What was the difference between *Dazzle Draw* and those earlier applications? Bernsten said there were two key differences. First, the expanded memory in the IIc and expanded IIe now made it possible to do “double high-resolution” graphics. Previously, the Apple II could only produce high-resolution graphics in four colors. Now you could get high resolution with more color choices. The second big difference was that *Dazzle Draw* used a Macintosh-style user interface, which made it easier for the user to manipulate menus and objects.

Cheifet then turned to Dowlen, an artist with Time Arts, Inc., and asked for his reaction to software like *Dazzle Draw*. Dowlen said he was impressed by the number of colors and high resolution available, as well as the speed at which images could be created on the computer. He said this opened up a whole new world for artists such as himself. Cheifet followed up, asking if it made him feel good or bad to use a computer versus traditional paint and brushes. Dowlen said some artists might be intimidated at first because they might think they need to know programming. But the computer was just a new medium, similar to when photography first came around.

Bringing a “Cinematic” Approach to Computer Animation

Robin Garthwait presented her second and final remote segment, which featured the work of Pacific Digital Images (PDI), a California-based company that produced animated computer graphics for the television industry. Garthwait interviewed PDI’s founder and president, Carl Rosendahl, who explained that animation and software development were similar. The tools used to develop software were in many cases applicable to also developing animation. You took a 3D model in a 3D space with a “camera” and “lights” that existed only as databases inside the computer. When that was all set up, you could then tell the computer to show you what a scene would look like through the virtual camera.

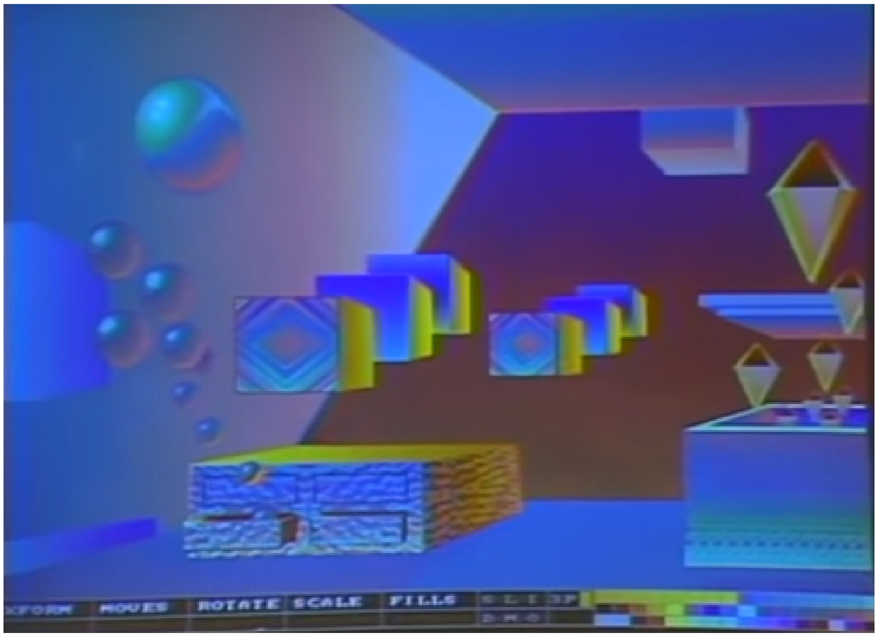
Garthwait noted that as the tools of the trade became more sophisticated, the designs became more subtle and complex. Rosendahl said that there was now more editing of shots in computer animation projects. He cited PDI’s recent work on the introduction to Super Bowl XIX for ABC, a 30-second piece that featured 10 different shots and was one of the first times the company had designed a piece with a “cinematic” approach. Rosendahl said that everyone at PDI had a rare cross between the arts and computer science. Most PDI employees had a technical degree as well as some background in the arts, such as film making, animation, sculpture, or photography.

Lumena Provided 3D-Like Power for a Price

Back in the studio, James Dowlen demonstrated his company’s product, *Lumena*. Cheifet asked what *Lumena* did that something like *Dazzle Draw* did not. Dowlen said with *Lumena*, the artist had access to an on-screen palette of 256 colors at any one time–out of a complete choice of about 16 million colors. And while his demo was set up to display a resolution of 512 pixels across, Dowlen said *Lumena* could create images of up to 2,024 pixels across. (For comparison's sake, the double-high resolution on the Apple IIc was 560 pixels across and the system had a total palette of 16 colors.) Morrow noted that 2,000 pixels-per-inch resolution was comparable to what could be achieved with 35mm color film.

Cheifet asked Dowlen about the hardware configuration used to run *Lumena*. Dowlen said there was an RGB monitor and a PC-type computer with a hard drive. Morrow said most of the expense was likely for the color monitor.

Dowlen then demonstrated the *Lumena* software, showing how you could manipulate an image pixel-by-pixel or by using various digital paintbrushes and effects. Morrow noted that *Lumena* created three-dimensional images, so at least you were "getting something for your money" versus other, 2D-only packages. Dowlen added the images made with *Lumena* rivaled those made using conventional airbrush painting.



Lumena

Cheifet asked about creating hard copies of art created in *Lumena*. Dowlen said the best method was to put it onto film using the Kodak Ektachrome format. This required using a separate digital-to-film recorder that cost between $3,000 and $4,000.

Data vs. Information

Paul Schindler was bullish on the future of computer graphics in his closing commentary. He noted there was a difference between *data* and *information*. Data was just facts, he said, while information added context that made information usable in making decisions. As computers became cheaper–and humans more expensive–Schindler said human graphics departments were destined to be replaced by computers. So computer graphics needed to do a better job converting data to information.

Computer Industry Slows Down as Apple Descends Into Confusion

Stewart Cheifet presented “Random Access,” which is dated in June 1985.

- Industry experts said that IBM would not release its previously promised PC-2 computer anytime in the foreseeable future. Cheifet said there had been rumors for months that IBM would release such a machine based on the Intel 80286 microprocessor, fueled largely by price cuts on existing IBM models. But now, analysts believed those price cuts were simply designed to move existing inventory and there would be a “long wait” before the PC-2.
- Cheifet said “confusion continues to rain” at Apple, with rumors of massive layoffs, a buyout by Steve Jobs, and even possible hostile takeover attempts. (The graphic accompanying this story is an all-time classic.)

Stewart Cheifet presenting a news story about Apple Computers. In the top right corner is a box with the old six-color Apple logo and a bunch of question marks, "??????????"

- Evidence of a growing slump in the computer business was everywhere this week, Cheifet noted. Layoffs were announced at Wang Computers, Control Data Corporation, Grid Systems, and Advanced Micro Devices.
- Cheifet said one part of the computer industry that was booming was security. The United States Government had a program called TEMPEST, which modified personal computers to eliminate the radio signals emitted by the machines. These signals could be read to indicate what the computer was doing. The National Security Agency said a $3,000 computer could end up costing $10,000 after making the necessary modifications.
- Paul Schindler–accompanied by his four-year-old daughter–presented his weekly software review, this time for *The Stickybear ABC*, a program designed to teach the alphabet to preschool children. Schindler said his daughter loved the program, which came bundled with a book and stickers.

- Early reviews were in for *Lotus Jazz*. Cheifet said the software earned praise for its ease of use and graphics, but critics pointed to the lack of memory, slow access, and a lack of macros.
- At the recent Robots 9 robotics conference in Detroit, manufacturers showed off new robots with vision and force-sensing capabilities. Cheifet said these industrial robots could recognize parts in any position and tell when things were going wrong by feeling the extra pressure when something didn't fit right.
- In the consumer robot market, former Atari executives Nolan Bushnell and Donald Kingsborough had each come up with competing computerized "pet robot" toys. Both men claimed they had already taken $75 million in orders for the 1985 holiday season.
- A New Jersey man became so addicted to the online CompuServe game *MegaWars* that he now faced prison time. The man stole a credit card number so he could stay online all night playing the space-themed game. Cheifet joked he may have won the interstellar war but lost the legal battle and now faced a five-year prison term and a $250,000 fine.

PDI Went from Making Super Bowl Ads to Hollywood Feature Films

The "Random Access" segment for this episode hinted at two subjects that would dominate the start of season three of *Chronicles* in just a few months–the overall slowdown of the computer industry and Steve Jobs' ouster from Apple. Jobs' departure would, oddly enough, lead to his taking a leading role in the growing market for computer graphics. In early 1986, Jobs acquired the computer graphics division of George Lucas' Lucasfilm Ltd., which was reorganized as an independent company called Pixar. At the time, Pixar was not in the business of making motion pictures–Jobs acquired the division so that he could sell high-end graphics workstations based on Pixar's technology.

The Jobs-led Pixar would later pivot to film and debuted its first computer-animated feature, *Toy Story*, in November 1995. But just a few weeks earlier, the annual Halloween episode of *The Simpsons* featured its own computer-animated segment, which was created by Carl Rosendahl's Pacific Data Images. (Rosendahl was credited as an executive producer on the episode). PDI's work for *The Simpsons* helped it to secure a relationship with DreamWorks SKG, the movie studio co-founded by Jeffrey Katzenberg, who also played a role in supporting Pixar as a Walt Disney executive.

DreamWorks initially acquired a 40 percent share of PDI as part of a deal to have the latter produce animated feature films and visual effects for the former. In 2000, DreamWorks acquired majority control of PDI and Rosendahl himself retired as the company's chairman. Since then, Rosenhdahl's most notable professional work has been as a Distinguished Professor of Practice with the Entertainment Technology Center at Carnegie Mellon University, where he has been since 2008.

Family-Owned Brøderbund Made Early Mark in Apple II Productivity Software

Although Steve Jobs' pride and joy, the Macintosh, was widely touted for its high-resolution (albeit monochrome) graphics, it's interesting that this episode pointed to the growing market for arts software for Jobs' neglected stepchild, the Apple II. *Dazzle Draw* was in fact just one in a growing series of productivity programs developed by Brøderbund Software, which largely focused on the older Apple II platform in the mid-1980s.

Brøderbund was formed by brothers Doug and Gary Carlston in 1980. As Doug Carlston told the story in his 1985 autobiography, he was working as a lawyer in Maine in the late 1970s. On the side, he wrote a game called *Galactic Empire* for the Tandy TRS-80 in 1979. Carlston mailed the game to a number of software companies, including Scott Adams' Adventure International. Adams and his wife agreed to publish *Galactic Empire*, and shortly thereafter Carlston decided to quit his law practice and write computer games full time.

Carlston traveled from Maine to Oregon, where his brother Gary lived, and after Gary managed to sell $300 worth of Doug's games to a computer store in Washington, DC, the brothers started Brøderbund. "Brøderbund" is not a real word. The name was taken from a word used to describe one of the factions in the original *Galactic Empire* game. As video game historian Jimmy Maher explained in his own overview of the company, Brøderbund was "a mash-up of Danish and German — or an example of a sort of pidgin Danish, if you prefer."

While Brøderbund may have started with Doug Carlston's games, it actually gained far more notoriety (and market share) as a publisher of productivity and educational entertainment titles. One of the company's earliest non-game offerings was *Payroll*, a payroll system for the IBM PC. The next year, Brøderbund published *Bank Street Writer*, a word processor for the Apple II, which became a major hit.

I couldn't find any specific explanation for what led to the development and release of *Dazzle Draw* in 1984. David Snider, the program's author, initially approached Doug Carlston and his sister Cathy (who was also working at Brøderbund) at a trade show in Chicago about a pinball game he was working on for the Apple II. In a 2013 interview, Snider said he was inspired by Bill Budge's *Raster Blaster*, another early Apple II pinball game, as well as a recently released pinball table called Black Knight.

Snider was actually driving to Kansas City when he decided to stop in Chicago and attend the trade show. After speaking with the Carlstons at the Brøderbund booth, Snider showed the Carlstons his pinball game prototype and left his contact information. A week later, Doug Carlston called Snider and told him that Brøderbund would publish the game, which became known as *David's Midnight Magic*. Snider said he went on to sign a contract with Brøderbund and remained with the company for the next 10 years. (Snider still works as a programmer today, creating apps for the iPhone and iPad as an independent developer based in Florida.)

Whatever its origins, *Dazzle Draw* proved to be another Brøderbund success story. According to one sales chart I found that was published by distributor Softsel in February 1986, *Dazzle Draw* was ranked the third best-selling home software product in the United States. Two other Brøderbund titles–*The Print Shop* and *Bank Street Writer*–were first and fifth, respectively.

Bernstein's Journey from Tech Journalist to Tech Startup Founder

As for the Brøderbund executive featured on *Chronicles*, Ed Bernstein, he started out as a journalist in San Rafael, California. After writing a glowing review of *Bank Street Writer* in a June 1983 issue of *InfoWorld*, Bernstein joined the company shortly thereafter. A September 1983 column by Herb Michelson of the *Sacramento Bee* described Bernstein's initial role at Brøderbund as that of an "editor" who played games submitted by independent developers, forwarding the ones he liked to a review committee for possible publication. Later, Bernstein oversaw Brøderbund's "new ventures" division, which according to video game historian Norman Caruso was initially created to publish *Personal Preference*, a board game created by yet another Carlston sibling, Don Carlston. This division basically took on products that were outside of Brøderbund's core competency in computer software, which after 1987 was primarily games for the Nintendo Entertainment System (NES).

As Caruso explained in a 2021 documentary for his *Gaming Historian* YouTube channel, Bernstein played a key role in what became one of Brøderbund's most notable failures–the U-Force. This was a laptop-like device that employed infrared sensors, allowing a player to control the NES using only hand movements. The U-Force was the brainchild of a former Mattel executive, Dave Capper, who happened to know Bernstein socially. Bernstein and a team from Brøderbund attended a demonstration at the home of Bernstein's engineering partner on the project. Caruso said Bernstein was "impressed" by the technology, but noted the project was still a risk for Brøderbund, which had no prior history producing hardware.

Despite these reservations, Brøderbund acquired the rights to Capper's project–later dubbed the U-Force–and poured millions into development, production, and marketing. A redesigned U-Force prototype "was the star of the show" at the 1989 Winter Consumer Electronic Show in Las Vegas, according to Caruso. Bernstein himself helped to fuel the hype. He told a reporter for Gannett that "we could design spectacular new games for this system." When pressed if any such games were actually in development, however, Bernstein replied, "Lots. How's that for mysterious?"

The CES buzz helped to generate almost $100 million in pre-orders, Capper told Caruso. But production delays and a lack of software support–it turned out there were zero U-Force-specific games actually in development–combined with strong competition from Mattel's Power Glove, ultimately doomed the project. Caruso said it was estimated that Brøderbund only fulfilled about $27 million out of the original $100 million in pre-orders. Brøderbund ended up selling off its entire new ventures division in 1990.

Bernstein also moved on from Brøderbund in 1990. After a brief stint at software developer Mindscape, Bernstein co-founded and served as CEO of his own company, Palladium Interactive, from 1994 to 1998. Palladium's biggest claim to fame was a series of satirical programs released under its Parroty Interactive label, including *Pyst*–a takeoff on Brøderbund's bestselling game *Myst*–and *Microshaft Winblows 98*, a lazy satire of Microsoft's operating system and corporate culture. (If you're interested in the latter program, I suggest this August 2020 video walkthrough from YouTuber Michael MJD.)

After the end of Palladium, Bernstein went on to found several other startups, including Photopoint, PhotoTLC, and Propell Technologies Group. He was most recently a partner in a San Francisco-based company called Salon Partners, LP, and apparently continues to work as a media training and technology consultant.

Lumena Creator Started Out Working with the Man of Steel

Lumena was clearly the most advanced graphics package featured in this episode. Not surprisingly, it was also the most expensive, although not quite as pricey as the Quantel Paintbox. A 1989 review by Dr. Rodney Chang said that when *Lumena* was first introduced in 1983, a PC workstation setup with the software ran about $20,000. By 1986, however, *InfoWorld* reported that you could purchase a *Lumena* workstation based on the IBM PC XT–including a color monitor–for around $5,000.

Lumena was developed by John Dunn, a computer programmer who also held a master of fine arts degree. Dunn's first job out of graduate school was with Atari, Inc., where he developed the game *Superman* for the Atari 2600. In a 2000 interview with Randy Ball, Dunn said Atari management reluctantly agreed to his request to program *Superman* on a 4 KB ROM chip–the standard was 2 KB at the time–because they "were afraid I would 'go artsy' and take a lot of time" to complete the game. Dunn said he got his 4 KB chip but was kept "on a very tight schedule" to ensure the game would come out not long after the release of the 1978 *Superman* film directed by Richard Donner. (Atari and the Superman franchise were both owned by Warner Communications at the time.)

After completing *Superman*, Dunn said he pushed Atari management to produce games with "a positive educational underpinning." When management balked, Dunn left the company to pursue independent game development. While working on what he described as a "robot building block game," Dunn said he found that the "graphics editor I made for the game was more interesting than the game itself." This led Dunn to turn his graphics editor into a standalone computer painting program called *SlideMaster*, which was released by the computer manufacturer Cromenco.

Off of *SlideMaster*'s success, Dunn founded Time Arts, Inc., in 1982 to develop a new digital graphics program that he initially called *EASEL* but later changed the name of to *Lumena*. According to Rodney Chang's review, Dunn left the day-to-day management of the company in the late 1980s and moved to Hawaii with his then-wife. Time Arts itself appears to have petered out in the early 1990s, and the *Lumena* software–which Dunn had continued to develop throughout the late 1980s–was acquired by another company, Western Imaging. Dunn later started another company, Algorithmic Arts. Dunn passed away in June 2018 at the age of 75.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of June 18, 1985.
- *MacDraw* was essentially an updated version of *LisaDraw*, one of the programs packaged with the ill-fated Apple Lisa. Mark Cutter is credited as the author of both programs. He worked at Apple until 1991 before moving on to a series of executive roles at a number of companies, most recently as chief technology officer at FoodChain ID.
- Marein Cremer, now known as Marein Cremer-Orre, currently works as a consultant and business coach in the German state of Bavaria.
- As noted above, this was the final episode of season two of *Chronicles*. It was also the final appearance of Robin Garthwait as a reporter. Wendy Woods will return for the start of season three.
- James Dowlen remains an active artist currently living and working in Oregon. According to Dowlen's website, he's done digital art work for high-profile clients in the entertainment industry and continues to perform private commissions.
- One of the "robot pets" created by Nolan Bushnell's company was AG Bear, a talking teddy bear, which will be featured in a future *Chronicles* episode.
- Doug Carlston wrote in his autobiography that he asked David Snider about creating a "generalized pinball microcomputer construction set" based on *David's Midnight Magic*. Carlston said Snider thought it wasn't possible with the existing technology. Bill Budge, of course, did create *Pinball Construction Set*, the subject of an earlier *Chronicles* episode. Carlston tried to get the publishing rights to Budge's program, but Budge of course ended up signing with Trip Hawkins' Electronic Arts. Carlston didn't seem to hold a grudge though, and said Budge deserved his fame as the "first software artist to become a pop star."
- The New Jersey man charged with stealing credit card information was at the time a 19-year-old pre-law student at George Washington University. According to an Associated Press report, he used his computer to hack into the database of a "credit reference company," identified customers with high credit limits, and opened accounts in their name, which he then used to fund his *MegaWars* habit. If you're wondering why he needed so much credit to play a game, like many early online services, CompuServe charged hourly

access fees. The man ran up $3,750 in charges. He did not end up going to jail, however, and instead received three years probation, a $500 fine, and was required to make restitution to his victims.

About the Author

S.M. Oliva is a freelance writer with over 25 years experience authoring original content for the web. He also spent over a decade working as a paralegal in probate, trusts, and estate planning. If you are looking to hire a freelance blogger or content creator for your own project, please feel free to contact him.